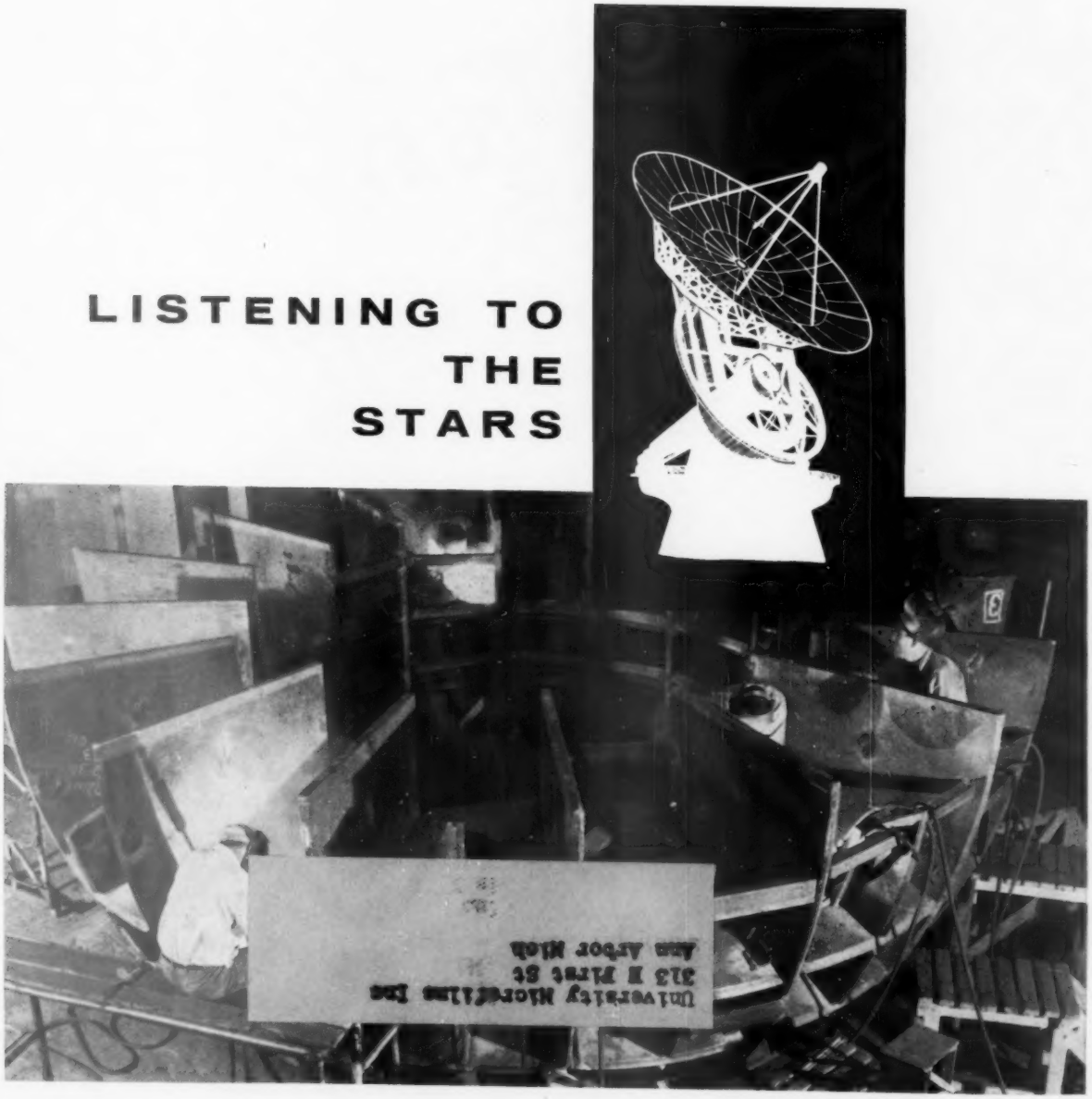
Welding Engineer

JULY, 1961
50 Cents

LISTENING TO THE STARS

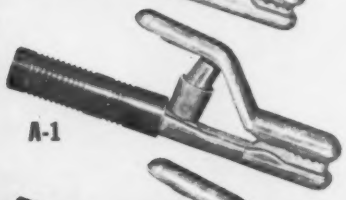


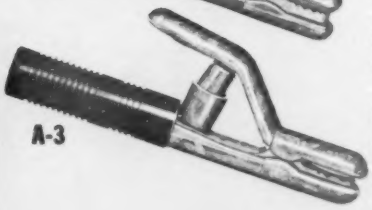
"Pick The Jackson Holder That Suits The Job!"

The *right* holder will speed the work, boost weld quality, and cut welder fatigue.

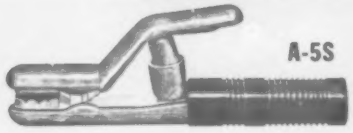
The right holder is one that's big enough to carry the required work load (determined by amperage, rod dia. and duty cycle), without burdening the welder with unneeded weight. The right holder for your work is one of the fourteen quality Jackson Holders listed below.

HIGH-PRODUCTION HOLDERS





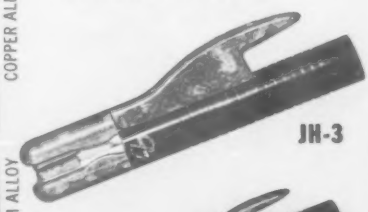
FEATHERLIGHT HOLDERS



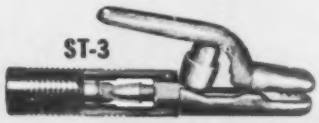
MAXIMUM CAPACITY AMPS	ROD	MODEL NO.	PRICE*	DESCRIPTION	
200	1/32"	JH-1	$4.50	High-Production Holders (See Duty Cycle Table)	COPPER ALLOY
300	1/32"	AW-C	6.50		
350	1/4"	A-1	7.15		
450	1/8"	A-3	8.90		
500	1/8"	A-3S	9.20		
300	1/4"	ST-3	7.90	As above, with Sealed-Tight Connection	
450	1/8"	ST-5	9.20		
300	1/4"	A-W	7.80	Featherlight Holders	ALUMINUM ALLOY
400	5/16"	A-5S	9.10		
200	1/32"	JH-2	7.50	Streamlined Featherlight Holders	
300	1/4"	JH-3	8.60		
300	1/4"	B-1	5.15	Economy Holders	98% COPPER
450	1/8"	B-3	6.65		
400	7/32"	B-4	5.00		

*All Prices Lower in Quantities

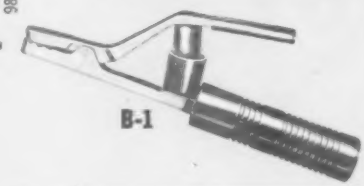
STREAMLINED HOLDERS



SEALED TIGHT HOLDERS



ECONOMY HOLDERS



HIGH-PRODUCTION HOLDER DUTY CYCLES

HOLDER CLASS	MODEL NUMBER	ELECTRODE DIAMETER	AMPERAGE	CABLE SIZE	DUTY CYCLE
SMALL	JH-1	5/32"	150 200	2 1	50%
MEDIUM	AW-C	7/32"	250 300	1 1/0	50%
	A-1 & ST-3	1/4"	300 350	1/0 2/0	50%
LARGE	A-3 & ST-5	3/8"	375 450	2/0 3/0	65%
EXTRA LARGE	A-3S	3/8"	500	4/0	80%

Sold Everywhere by Better Welding Supply Distributors

Jackson Products

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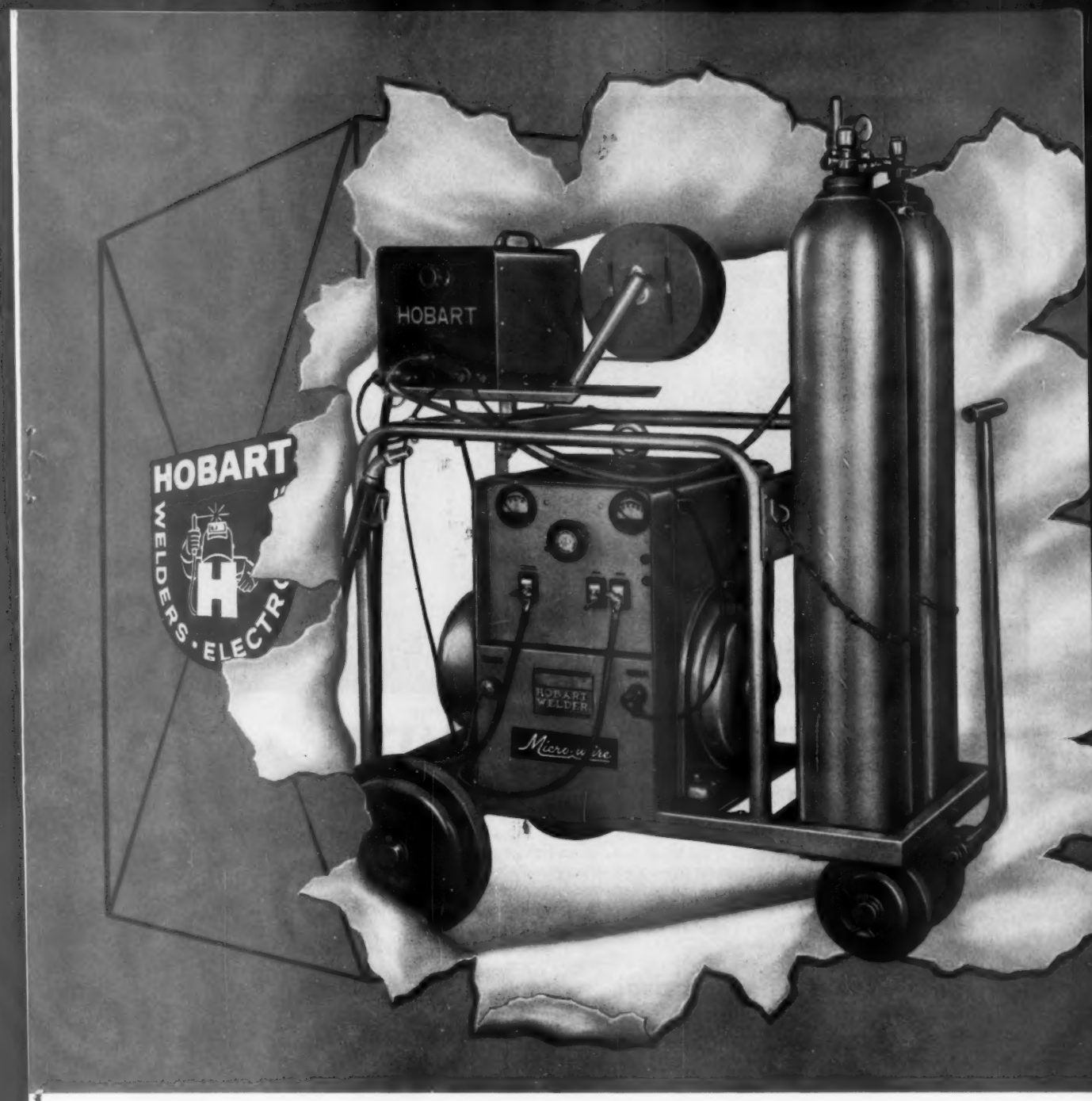
For more facts Circle No. 150 on Welding Info-Aid Card



"the most popular package in the welding industry"

The popularity of the Hobart "Micro-wire" package is growing at an unprecedented rate due to the cost-saving records it is setting.

The real test of any welding process is the *ultimate cost per pound of sound deposited weld metal.* Based on such a test, "Micro-wire" is being chosen by more and more metal-working companies as the most efficient and economical welding process.

Look at the advantages it offers: . . . it eliminates costly clean-up after welding . . . it makes sound welds in all positions . . . can bridge gaps up to twice base metal thickness . . . feeds welding wire automatically . . . eliminates electrode changing and stub loss . . . welds up to 50% faster than stick electrodes . . . inexpensive shielding gases . . . can be used easily by any operator . . . reduces operator fatigue . . . comes in a compact, low-cost, easily portable package.

If you weld sheet metal, tanks, vessels, containers, heating and air conditioning equipment, metal furniture, piping, tubing, or do similar types of metal fabrication, you should investigate "Micro-wire." It is the answer to your welding problems.

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Write for bulletin DM-177. Hobart Brothers Company, Box U-71, Troy, Ohio

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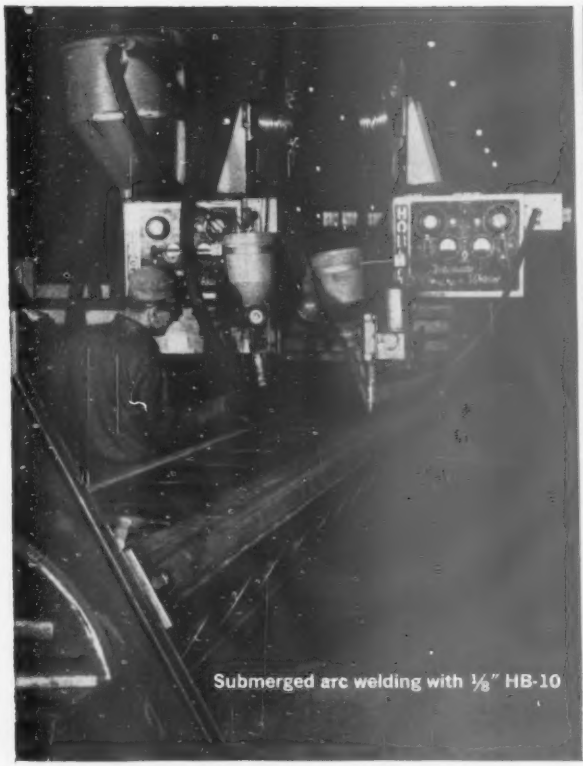
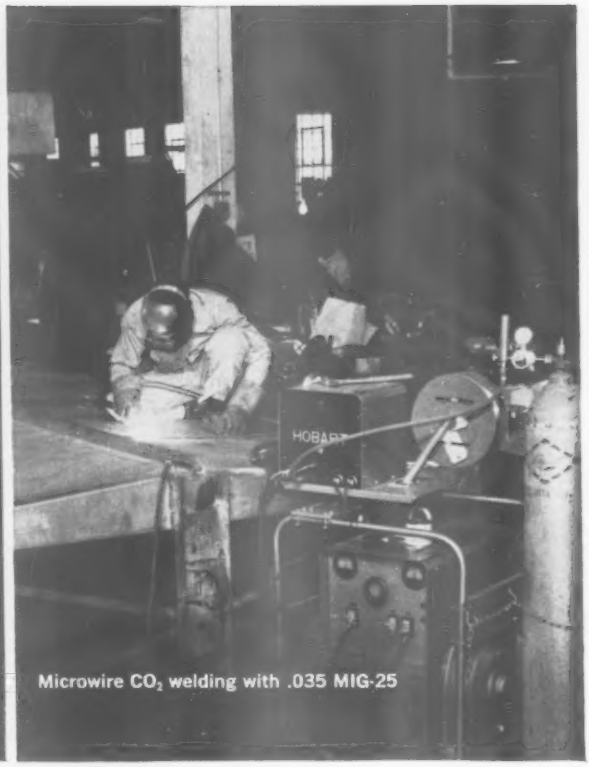


Submerged arc welding with 1/8" HB-10



Microwire CO_2 welding with .035 MIG-25

SELECTION GUIDE
FOR AUTOMATIC WELDING WIRE

Tear out this page. Keep it handy. It will help you make logical wire selections. Naturally, we'd like you to keep in mind these facts about Hobart automatic welding wire: There's a special wire available for every application (semi-automatic submerged arc, inert gas, CO_2, and hardsurfacing). All Hobart wire is processed to operate with standard makes of welding equipment—and it has been tempered to operate efficiently through welding head feeding mechanisms.

PHYSICAL PROPERTIES AS WELDED:

Typical Uses—For Welding:	Sub. Arc	CO_2 or Argon	Tensile (psi)	Elongation (In 2")	Hobart Type
Mild Steel	X		55,000	30%	10
Low Alloy Steel; Pressure Vessels	X		85,000	20%	16
Low Alloy & Free Machining Steel & Micro	X	X	80,000	24%	18
Heat Treatable Steels; CO_2 Auto Frame Welding	X	X	75,000	26%	20
Micro-Wire; General Purpose CO_2		X	75,000	26%	25
Large Wire CO_2; hard to Weld Steels		X	75,000	30%	30
Build-up & Hardfacing	X		105,000	5%	65
Hardsurfacing; Abrasion & Impact Resistant	X		116,000	4%	6150
Most Stainless Types Available	X	X	—	—	Stainless

Tubular wire for CO_2 fabrication, and hardsurfacing, as well as stainless and nonferrous, are also available. Write for catalog.

HOBART WELDERS • ELECTRODES

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"Manufacturers of the world's most complete line of arc welding equipment"
International Sales, Hobart Brothers A. G., Box 5500, Nassau, Bahamas

VOL. 46—No. 7

Welding Engineer

The magazine of joining and severing of materials

This is welding: July, 1961

Cover photo . . . rigid grid support for 22-ft spherical bearing on which giant radio telescope will rest is manual metal-arc welded.

Giant radio-telescope will tune-in outer space 35
Some difficult welding problems were encountered when fabricating the support structure for this 140-ft-diameter dish-type "super ear," designed to pull in radio waves from outer space. Tolerances usually associated with small, precision parts were met, however, when joining the massive components.

Aluminum alloy bids for larger share of cryogenic market 38
Aluminum's share of the cryogenic market is expected to increase almost 1000% by 1965. This highly optimistic forecast by authorities in the field is based on 5083 aluminum alloy's test-proved weldability and weld ductility, as reported in this second article in this cryogenic metals series.
★ (For a reprint of this article, circle 249 on Welding Info-Aid Card.)

How to deposit hardfacing alloys 40
When hardfacing, first analyze the job, then select the proper electrode. But before depositing the hardfacing alloy, the workpiece must be properly prepared — surfaces cleaned, depressions filled and/or builtup and, when required, preheat applied — as described in this concluding article in a series.
★ (For a reprint of this article, circle 250 on Welding Info-Aid Card.)

15 ways to reduce short span steel bridge costs 42
Welded design and progressive construction methods can reduce your bridge costs significantly so you can include more projects within a fixed budget. Here are 15 approved ways to obtain these economies without sacrificing quality.

Ship repair firm leans heavily on welding 44
This company is not a welding job shop, but it does as much repair welding as most large maintenance departments. Editor **F. T. Tancula** details some of the firm's jobs — including repair work done on Admiral Dewey's flagship, the cruiser *U. S. S. Olympia.*

Also in this issue:

New film shows how to weld T-1 46
Giant steel "cans" line hydroelectric power tunnels 48
Railroad car linings installed faster with welded studs 50
192 joints brazed simultaneously to chemical reactor 60

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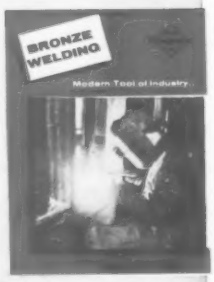
helps build things...

things like tricycles and bicycles for junior's play. Whatever your application, in building or maintenance, look for the rod with "Bridgeport" stamped on it. Strict laboratory control assures dependable performance. Every Bridgeport welding alloy tins easily . . . flows freely and produces dense, sound, non-porous welds of uniformly high strength and ductility. It's available in standard rod sizes and lengths, and coils or spools for automatic equipment. Call your local distributor.



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BETTER 3 WAYS

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"Shortstub" deposits the full fluxed portion of each electrode . . . saves you 15% to 20% of your total electrode cost.

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. . . cooler regardless of duty cycle. *Try a "Shortstub" and feel the difference!*

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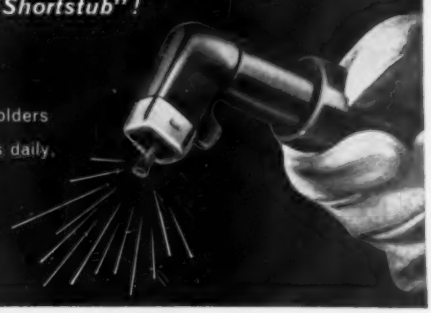
Completely insulated with "Lifeguard" insulation, "Shortstub" will withstand direct arc heat, electrode after electrode . . . stands up to severe and repeated shock and impact.

Write today for bulletin SS7, describing the *MANY features of "Shortstub"!*



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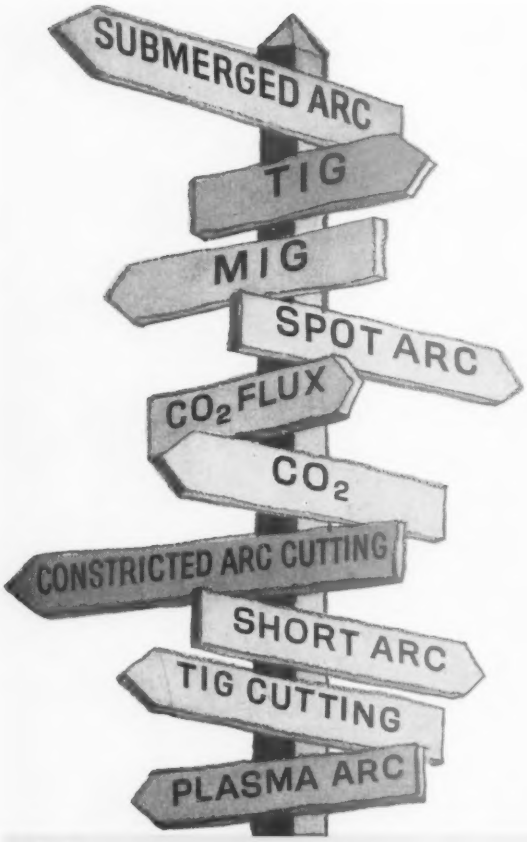

WHICH WAY?

There are many ways to weld, but you want the one that *best* fits your needs. Your choice is determined by metals, thicknesses, designs, joints...and your fabricating objectives—economy, quality, speed, strength, appearance, precision. Which welding process should you use? Tig? Mig? CO_2? Spot welding? Manual, semi-, or fully-automatic? Would a cutting process simplify production? Correct answers to these questions require experience with the major arc welding and cutting processes—from submerged arc to plasma arc—introduced during the past 25 years. LINDE has *all* of these processes. No other company does. In fact, LINDE *introduced* almost all of them...and *improved* the rest. Consequently, LINDE has far more experience with tungsten-arc cutting, inert-gas welding, and continuously-fed electrode welding than any other company in the world. In many cases, these processes are ideal. In some, they are even a necessity. Because we have all of them, we recommend only the one that *best* fits your needs. When making your choice, bear in mind that a recommendation from an equipment manufacturer is apt to be *only as accurate as the completeness of his line.*

LINDE COMPANY
Division of Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.

UNION CARBIDE

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July Headlines

LEE Wade, sales manager for All-State Welding Alloys Co., Inc., leads the way to the recent open house with NWSA members close behind.

All-State holds 15th anniversary open house

An open house and plant tour recently helped All-State Welding Alloys Co., Inc., White Plains, N.Y., celebrate its 15th anniversary.

The open house ceremonies were held to coincide with the final session of the National Welding Supply Association's annual convention. Chartered buses, brought NWSA delegates and their wives from New York to White Plains for a luncheon prior to the open house.

Deadline nears for Lincoln program

Participants in the 1961 $25,000 award program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, must submit papers no later than July 17.

Current competition is the 25th in a series of annual award programs sponsored by the Foundation.

Marquette Corp. buys Heyer Industries, Inc.

The Marquette Corp., Minneapolis, has purchased Heyer Industries, Inc., Belleville, N.J., which includes Heyer Products Co., Heyer Service Co., and several affiliated companies.

Included in the purchase are Heyer's 150,000-sq-ft plant at Bangor, Pa.

Canadian Liquid Air has 50th anniversary

Canadian Liquid Air Co., Ltd., Montreal, Canada, is celebrating its 50th anniversary.

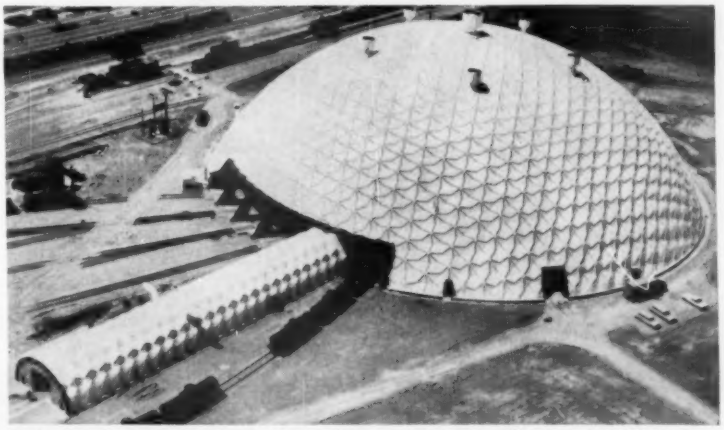
The firm, Canada's largest oxygen producer, is a division of L'Air Liquide, Paris. The parent firm has designed, built and operated more plants for recovering oxygen, nitrogen, argon, neon, acetylene, etc. than any other company in the world.

Abrasive Grain Assn. prepares booklets

The Abrasive Grain Association, Cleveland, is preparing a series of booklets explaining the composition and major uses of abrasive grain.

Booklets, which will be published late this year, will cover history and physical and chemical properties of abrasive materials in addition to all uses of abrasives.

Huge circular building is welded



THIS all-steel regional tank car repair plant at Wood River, Ill., has a 380-ft diameter and stands 120-ft high. Built by Union Tank Car Co., Chicago, this welded structure is the largest circular building in the world without internal supports. Union Tank Car built a similar dome at Baton Rouge, La., in 1958.

COMING EVENTS

JULY 18-20: Western Plant Maintenance and Engineering Show & Conference, Pan Pacific Auditorium, Los Angeles.

JULY 21-23: Eastern Regional Meeting, AIRPS, The Schine Inn, Chicopee, Mass.

SEPT. 12-14: 3rd Annual Southeastern Maintenance and Engineering Show, Greensboro War Memorial, Greensboro, N.C.

SEPT. 18-22: Summer Conference Course on X-Ray and Radioisotope Nondestructive Test Techniques, The Ohio State University, Columbus, Ohio.

SEPT. 20-22: AEC Welding Forum — Annual Meeting, Southwest Research Institute, Granada Hotel, San Antonio, Texas.

SEPT. 25-28: Fall Meeting, American Welding Society, Adolphus Hotel, Dallas, Texas.

OCT.: Annual Convention, AIRPS, O'Hare Inn, Des Plaines, Ill.

OCT. 16-20: National Safety Congress and Annual National Safety Council Convention, Chicago.

OCT. 23-25: Fall Meeting, Abrasive Grain Association, Waldorf-Astoria Hotel, New York City.

OCT. 23-27: 43rd National Metal Congress, American Society for Metals, Cobo Hall, Detroit.

Liquid Carbonic plans nitrogen-oxygen plant

Liquid Carbonic Div., General Dynamics Corp., Chicago, has broken ground for a new liquid nitrogen-liquid oxygen plant in Tewksbury, Mass.

American Messer Corp., New York City, will construct the plant which is expected to go on stream January 1, 1962.

Eutectic executives take tour

EXECUTIVES of the Eutectic Welding Alloys Corp., Flushing, N.Y., recently went on a nationwide tour to get acquainted with field representatives. One group consisted of (from left) R. F. Fox, J. A. Quaas, Mrs. R. D. Wasserman, R. D. Wasserman and W. W. Brennan.

Whitehead Metals opens new Baltimore office

A new sales office and warehouse has been opened in Baltimore by Whitehead Metals, Inc., a subsidiary of The International Nickel Co., Inc., New York City.

The new building has 30,000 sq ft of warehouse area and 4,000 sq ft of office space.

Linde expands for cryogenic market

A new plant for applying flame-plated coatings is in production and plans have been made for a $2.5 million expansion of cryogenic equipment production by Linde Co., New York City.

The flame-plating plant is located at North Haven, Conn.

For its cryogenic services, Linde is planning to expand and modernize its manufacturing facilities at East Park Drive and Woodward Ave., Tonawanda, N.Y.

Free flux samples offered by Krembs

Krembs & Co., Chicago, is offering a free sample of your choice from its Fluxine line.

These fluxes are for silver brazing and soft soldering stainless steel, aluminum bronze, manganese bronze and beryllium copper and for various joining methods of many other metals and alloys.

For your sample write on company letterhead to: Krembs & Co., 669 W. Ohio St., Chicago 10, Ill.

High school projects receive recognition

FOR the third year, St. Joseph Bank & Trust Co., South Bend, Ind., displayed in its lobby welded projects produced in local high school classes. Inspecting one display are, from left, Floyd M. Dickey, industrial arts supervisor of South Bend schools; Emil Manula, high school welding instructor; and E. D. Badger, executive vice-president of the bank.

HIGH SCHOOL students Roger Chorney (left) and Anthony Mullozzi are shown metal-cutting equipment by John La Pota of the National Cylinder Gas Div., Chemetron Corp. The two boys recently exhibited an ion exchange fuel cell at a Chicago science fair.

Now—gritty contaminants of gases can no longer interrupt service...not when you use a KG regulator with the new stainless steel sintered filter.

PROOF: we surrounded this regulator with fine beach sand; we clogged up the inlet nipple deliberately, then opened the valve. Not a particle of sand came through the filter. None reached the seat. And gas volume and pressure were undisturbed!

SHOWN: one of the new KG 1200 Series Single Stage Regulators that delivers Two Stage Performance. These new KG regulators give superior performance, longer life, faster and easier maintenance. They feature bodies and bonnets of anodized aluminum alloy forgings that are stronger, lighter, more resistant to corrosion; a large diaphragm that greatly increases sensitivity; the new filter that practically eliminates seat failure; ball bearings in adjusting mechanism to allow smooth, accurate control with mechanism itself fully enclosed for complete protection against damage or loss.

BROCHURE: we'll be glad to send you a copy of our new brochure that spells out in detail the working advantages of KG Regulators.

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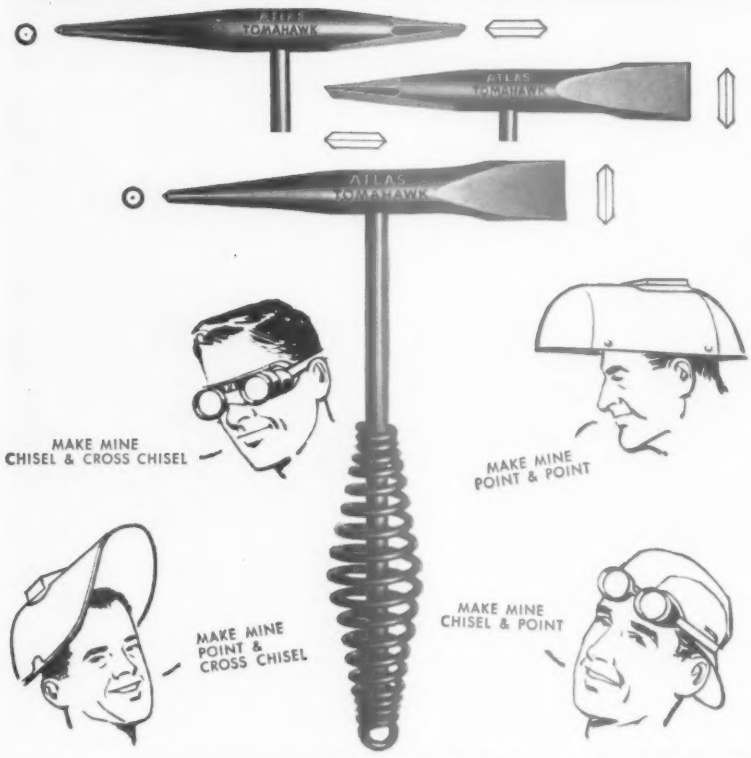
ATLAS | WIDE - BLADE TOMAHAWKS

WORLDS LEADING WELD CLEANING TOOLS



all-metal ATLAS TOMAHAWK *has* "WIDE BLADE", *too!*

They all agree—They get anything and everything they want in an ATLAS TOMAHAWK: Burn-proof, break-proof, shock-proof grip with metal shaft, balance, feel and turn-proof head in the style they want. This is the tool that made ATLAS famous. Everyone likes it—even the man who spends his day on one end of it!

Tough as they come!

33 MODELS

Each Atlas tool is made as well as we know how. Ask your welding supply dealer to show you the complete line.

ATLAS WELDING ACCESSORIES INCORPORATED
707 E. LEWISTON
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Letters

Show tired

Your editorial, *"Too Many, Too Often,"* which appeared in the May 1961 issue, struck a responsive chord with us for we decided long ago that the number of shows was approaching the ridiculous. We also decided that the so-called National Welding Show was actually a glorified regional show with 90% of the attendance drawn from a comparatively small adjoining area. The other 10% included the personnel of the exhibitors.

We are wondering if it would be wise for AWS to set up a show committee with the power to sanction regional or local shows *before* they can use the AWS name or insignia. The show committee could then control the dates and location of regional shows so they could not conflict or interfere with the national or other regional shows.

Although welding equipment and technology are progressing rapidly, a triennial national show and the limiting of shows to one every third year in any given region might help solve the problem. We would also suggest that no regional show be held the year of the national show. Certainly this would increase the attendance of people from all over the country . . . because there would be no conflicting regional shows. Likewise, regional shows would benefit because people would not be choosing between attending the national show or a regional show in any given year. For example, the national show could be held 1961, 1964, 1967, etc. Regional shows would be permitted 1962, 1963, 1965, 1966, etc.

The NWSA should follow a biennial schedule with the national convention meetings on odd years and the regional meetings in even years. Although this arrangement would schedule the AWS and the NWSA meetings the same year at intervals of six years, it would be an improvement over the present set-up.

"Show tired"

Flame straightening

With reference to your story on pages 80 and 81 of WELDING ENGINEER May, 1961 on flame straightening, we do not know anything about Mr. Holt being the originator of this process. We have been doing it successfully for the past 30 years in our plant on various jobs for the cambering of beams, etc.

One point not mentioned is that you can use fire to fight fire by heating a large V on one convex flange. While that is cooling, heat a smaller V on the concave side. The larger V cooling, stretches the concave side. This procedure saves lots of time and simplifies difficult straightening of heavier sections.

William G. Findorff
Steel Fabricating Co.
Muskegon, Mich.

—We have been publishing articles on the flame straightening process for many years, and have always credited Joseph Holt as the originator. Nevertheless, it is quite possible that more than one man or company realized the potential of the torch at about the same time.

Although Mr. Holt published a book on the subject, copyrighted in 1938, his work goes back much farther than that. — Ed.

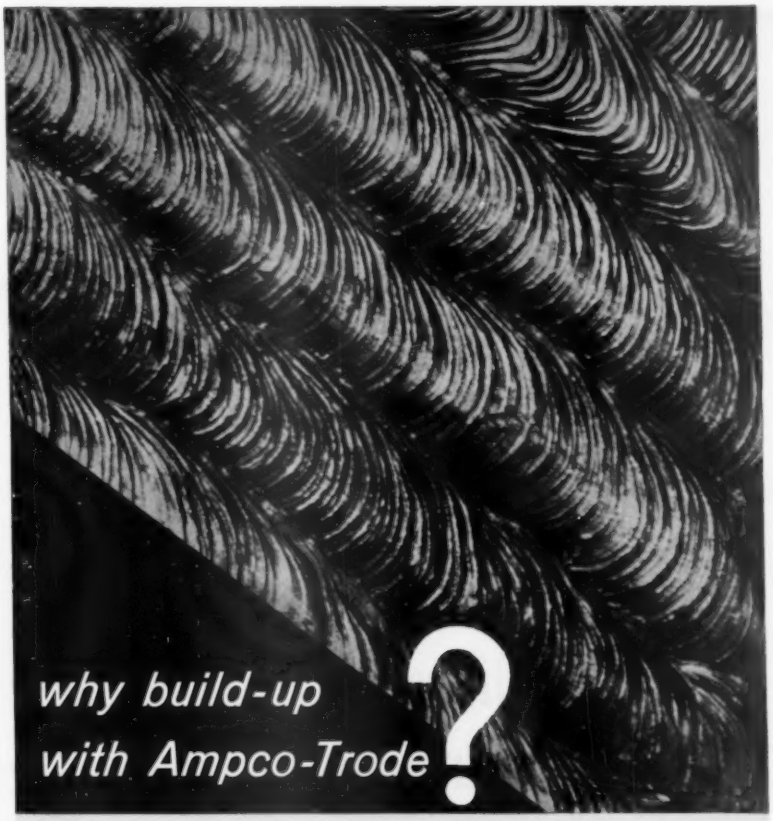
Oxygen producers

We are subscribers and readers of WELDING ENGINEER and enjoy the publication immensely and depend upon the information that we receive from it to bring us up-to-date on all the happenings in this industry.

However, we feel that our company has been omitted from your list of independent oxygen producers (WELDING ENGINEER, Feb. 1961, page 31). We have been manufacturing oxygen in the Greater New York area for the last eight years and we feel that we should be included in your list along with the others in this field.

Irving Edelson
Sandler Medical Gases, Inc.
Sandler Air Products, Inc.
Maspeth, N. Y.

—We regret the omission of Sandler from our list of oxygen producers. This mistake has been rectified and your company is listed in the new 1961 *edition of our* Fact File *directory issue which was published last month. — Ed.*



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There are five Ampco electrodes specifically designed for build-up: Ampco-Trode 10, 160, 200, 250, and 300. They offer you a hardness range from 160 to 380 Brinell: resist sliding wear, shock, squashing out, erosion, cavitation-pitting, corrosion. Available in coated or bare filler rods.

Order from your nearby Ampco distributor, or mail coupon below, today.

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AMPCO METAL, INC.
Dept. 186, Milwaukee 1, Wis.
Send me Bulletin W-17 on Ampco-Trode electrodes for overlay applications.

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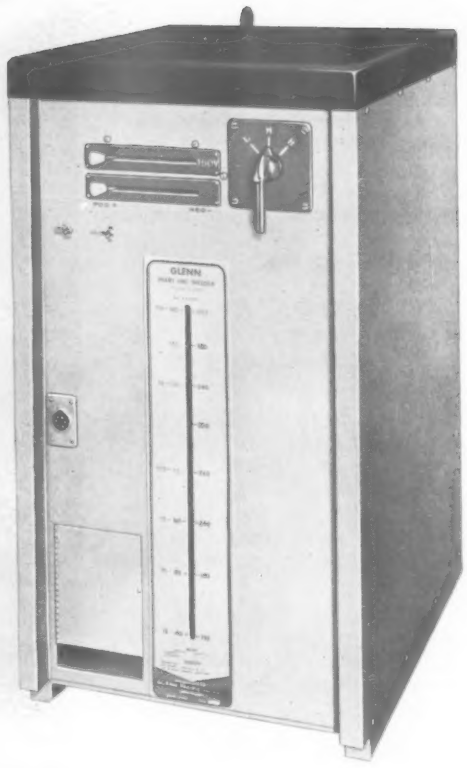
Handles All Your Heliarc (TIG) Requirements!



Balanced-Wave ac output for aluminum, magnesium and alloys requiring ac current. Capacitor bank in output circuit to block dc feedback and use of non-saturable components assures uniform electron flow in both directions for better cleaning action, improved welding.

Full-range dc output for stainless and other metals requiring dc. Built-in polarity switch.

Motorized full range (25-400 amp) current control with plug-in provision for remote control, covered in 3 overlapping vernier ranges. (Foot switch and cable for remote on-off, increase-decrease control available.)

Built-in pulsed high frequency with automatic post-ignition cutoff control provides arc ignition without electrode contact, eliminating contamination.

Built-in automatic gas and water controls available.

TWO MODELS (AC/DC and AC only)

Output	Model BW400AC	BW400AC/DC
Open circuit, ac	100 or 150 v	150 v
Open circuit, dc		80 v
Current Ranges (@ 20v)		
Low	25-58 amps	
Medium	53-175 amps	
High	165-400 amps	

If you want the finest TIG performance **plus** cost-cutting versatility in one compact, convenient "package", Glenn BW400 Power Supplies are definitely the answer. Write today for literature, specifications and prices. (Manufactured under license, Patent No. 2,472,323.) "Heliarc," reg. TM's of Union Carbide Corporation

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6

DATELINE: *Washington*

Signs that the White House still gives No. 1 priority to increased credit flow, through huge appropriations and working of the complex mechanisms in the executive branch, continue to multiply.

Some observers believe that this great outpouring of credit will have a salutary effect and that an appreciable dent will be made in the hard core of five million unemployed as a result. Others are claiming the moves will bring inflation, cheap money and are making other predictions about the long future.

On measure after measure, all costing relatively huge new sums compared to recent years, a substantial majority of both Republicans and Democrats have gone along with the President. Only recently Congress put the finishing touches to a new $6.1 billion omnibus housing bill, which he undoubtedly will sign.

The price level has remained relatively stable, so far. But under the pressure of the huge new federal outlays, there is uneasiness in some circles here that inflationary trends will become strong again.

The White House is not perturbed. There is a unanimity of feeling among White House advisers that competition will keep the price level stable. Even if prices do move upwards, they say that the enormous pressure of the administration will be brought to bear on companies which try to raise prices out of sight. These advisers further believe that Congress would go along with price controls if there were a real inflationary threat.

A sample of how various agencies are stepping up this flow of credit may be seen in the actions of the U. S. Small Business Administration.

SBA administrator John E. Horne announced approval of 501 loans in April, for $27 million total. This was 35% more in number and 62% higher in dollar volume than the loans approved in April, 1960.

To ilustrate the need existing among small businessmen of all kinds, he said that SBA applications now are numbered in the thousands each month. The SBA is seeking $150 million in new credit from Congress to be used in addition to the half-billion dollars in its revolving fund.

* * *

Case activity at the National Labor Relations Board continued at high levels during the first quarter of 1961, although work stoppages were at a minimum during the same period. This indicates that labor and management are turning more and more to hard bargaining rather than resorting to strikes, etc., as a method of solving labor-management disagreements.

The filing of unfair labor practices rose 22% over the previous quarter. Unions filed 37% of the complaints; employers, 13%; and individuals, 50%.

* * *

The tax proposals the President sent to Capitol Hill have faced a withering barrage of criticism from all sides. Businessmen generally have fought the administration's ideas on limiting allowable deductions for travel to $30 a day. This seems to be the most unpopular facet of JFK's proposals.

* * *

Treasury Secretary Douglas Dillon promised Congressmen that a full-scale, true tax reduction measure would be forthcoming during the next session. It would provide relief for both the higher-income earners and the low-income groups, he promised. However, any promise of longterm tax relief appears to be quite illusionary. The deficit will be at least $4 billion in this fiscal year. And the outlook is for bigger deficits in the future.

FOR HIGH TEMPERATURE SERVICE INVOLVING IMPACT, ABRASION AND CORROSION...

Wear-Arc & Wear-Flame

CoCr-A, CoCr-B, CoCr-C

Cobalt—Chromium—Tungsten Hard Surfacing Alloys

Wear-Arc & Wear-Flame CoCr alloys are ideally suited for applications such as high pressure steam valves and seats, mill guides, hot shear blades, bearing surfaces, brake drums, engine cams, coke pusher shoes, automotive and diesel engine valves, conveyor screws or any application where high temperature is combined with abrasion, corrosion and impact wear.

Abrasion, corrosion and impact at temperatures above 1000° F. demands ultimate service from a hard surfacing alloy. Wear-Arc and Wear-Flame cobalt-chromium-tungsten alloys are designed in alloy content and balance to resist these destructive forces—protecting parts made from ordinary steels with heat resisting, abrasion resisting, impact resisting overlays greatly extending service life.

Three Wear-Arc and Wear-Flame cobalt-chromium-tungsten alloys allow proper selection to match wear protection to the wear factors involved. They are products of the electric induction melting process, insuring maximum uniformity of alloy content. The cast core wire is centerless ground to insure accurate wire diameters. Each alloy is available in Wear-Arc coated electrodes for electric arc application or bare rods in 14" or 6' lengths for gas application. Wear-Arc electrodes have extruded coatings which produce arc characteristics that cannot be matched by dip coated electrodes.

For additional information concerning specific application methods, procedures and alloy selection, write Alloy Rods Co., P. O. Box 1828, York 2, Pennsylvania.

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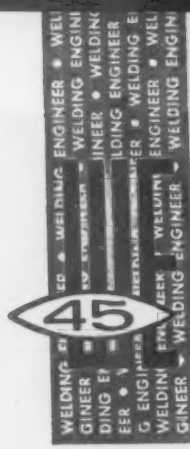
TWENTY YEARS OF LEADERSHIP IN THE DEVELOPMENT OF QUALITY ALLOY ARC WELDING ELECTRODES



Your July, 1961

Weld World

As WE went to press, these were the industry's latest developments:

. . Speer Carbon Co., St. Marys, Pa., will become part of Air Reduction Co., Inc., New York City, if directors of both firms and stockholders of the former approve. Speer's business will continue to be operated at its present headquarters under the same management.

. . Berkeley-Davis, Inc., wholly owned subsidiary of The McKay Machine Co., Youngstown, Ohio, has purchased The Berkeley Co. Both firms are in Danville, Ill. Berkeley-Davis will continue to build the Berkeley line of standard fusion welders, as well as its own weld mills and special transfer type welding machines. Increased emphasis will be placed on manufacture of complete automatic transfer lines incorporating McKay coil handling and forming equipment, Warco presses, Federal resistance welders and B-D's fusion welding machinery.

. . Kamweld Products Co. is the new name of Kamlar Products Co., Norwood, Mass., manufacturer of welding equipment and high-speed tools for thermoplastics. Kamweld is also the new trade name, replacing Kamlar.

. . The first spiral-weld steel pipe made in the United States on Driam mobile equipment has been laid for a gas distribution line in Ohio. The portable mill for on-site welding of spiral pipe directly from coil stock or plate was described in WE, Nov., 1960, p. 79.

. . Merger between Bridgeport Brass Co. and National Distillers & Chemical Corp. has been approved by stockholders of both firms. Bridgeport became a division of National on the first of this month. A major factor behind the merger: the growing relationship between metals and plastics, e.g., plastic-coated metals.

. . More steel price cuts may be coming. Producers said big tonnage products would cost the same, but reductions in some lines may follow those already made for stainless steel, rebar and wire rope. But don't count out possibility of a price increase in some products this fall, especially if demand quickens.

. . That price reduction in stainless is likely to keep aluminum prices down, at least for present. Despite increased labor costs due Aug. 1 under major union contracts, aluminum producers fear a price boost would hurt their competitive position.

This is a P&H engine-driven welder.
We make 10 different kinds.
All sizes. All good. All dependable.
Nothing fantastic about how they work.
They just weld good like they should.
Know why?

We build 'em as though we were going to buy'em ourselves!

Know a better guarantee of quality?

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P&H WELDING PRODUCTS DIVISION

Between passes

award to Alloy Rods

A certificate of special merit was awarded Alloy Rods Co., York, Pa., for the outstanding quality of its 20th anniversary booklet, "A Contribution to Welding." The award was made by the New York Employing Printers Association at the recent 19th Exhibition of Printing in New York City.

Designed and produced by C. W. (Bill) Pilkey, Alloy Rods' manager of advertising and sales promotion, the 36-page book introduces the firm's management, facilities and personnel.

ARF anniversary

Another anniversary celebrant this year (WELDING ENGINEER is marking its 45th anniversary throughout 1961) is Armour Research Foundation of Illinois Institute of Technology, Chicago. It is 25 years old.

From a modest beginning in a few basement rooms at Armour Institute in 1936, the Foundation has grown to a seven-building complex on Technology Center, the campus of IIT. From two research projects valued at $40,000 during its first year, ARF has become one of the largest research organizations in the world. Research volume for its last fiscal year totaled $16.5 million.

The silver anniversary celebration will continue through May, 1962.

"I'll be right down."

Old WE copies

Howard B. Cary, director of the Hobart Brothers Technical School in Troy, Ohio, is interested in acquiring complete volumes of back issues of WELDING ENGINEER. The school already has bound volumes for the years 1944, 1945, 1947, 1950 and 1953 through the present. But Cary would like to have complete volumes for the missing years.

Can any of our readers help him?

a pioneer

A man who recognized early the value of welding was the recipient of the Machine Design Award of The American Society of Mechanical Engineers. Robert G. LeTourneau, pioneer builder of giant earth moving equipment, was honored at the recent Design Engineering Conference in Detroit.

He was cited by ASME for "outstanding achievement and distinguished service in the field of Machine Design; for innumerable ingenious engineering contributions associated with the design and production of a wide variety of heavy machinery in earthmoving and other heavy-duty materials handling."

LeTourneau began his pioneering tradition in the Twenties when he introduced the widespread use of the then-revolutionary process of welding to the construction of land-leveling machinery.

KROMER **Captain of Caps**

None genuine without the Kromer Trade Mark

ALL CLOTH COTTON CAPS washable — non-binding. Balloon or pleated tops. Colors: Polka Dots; Red, Blue, Green, Brown, Black; the white dots are ½". Also Plain white, white with black visor, Harvest Brown with black Stripe, White with Black Stripe; Tan, Black, Grey, Red, Evergreen, Hickory Stripe, Express Stripe; Tan and White star, Olive and white star, Red white & Blue star.
Retails at .....$1.00 each

ALL WOOL WINTER SPORTS CAPS with ear Bands. Colors: Black and White, Red and Black, Green and White, Tan and White, All Red.

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WOOL COTTON LINED with ear band 4 piece top in Navy Blue, Black or Dark Oxford Grey. All Red.
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LIGHT WEIGHT COTTON WINTER CAP with ear band. Lined. Colors: Black, Maroon, White, Blue with white dot, Express stripe, All Red.
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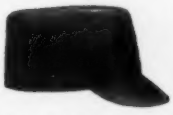

FLAT TOP wool Uniform cloth with Ear Band. Navy Blue or Black.
Retails at .....$4.25 each

We welcome your inquiries for dozen or gross lots. Samples of caps or swatches sent at your request.

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Be sure to state size when you order.

No COD's

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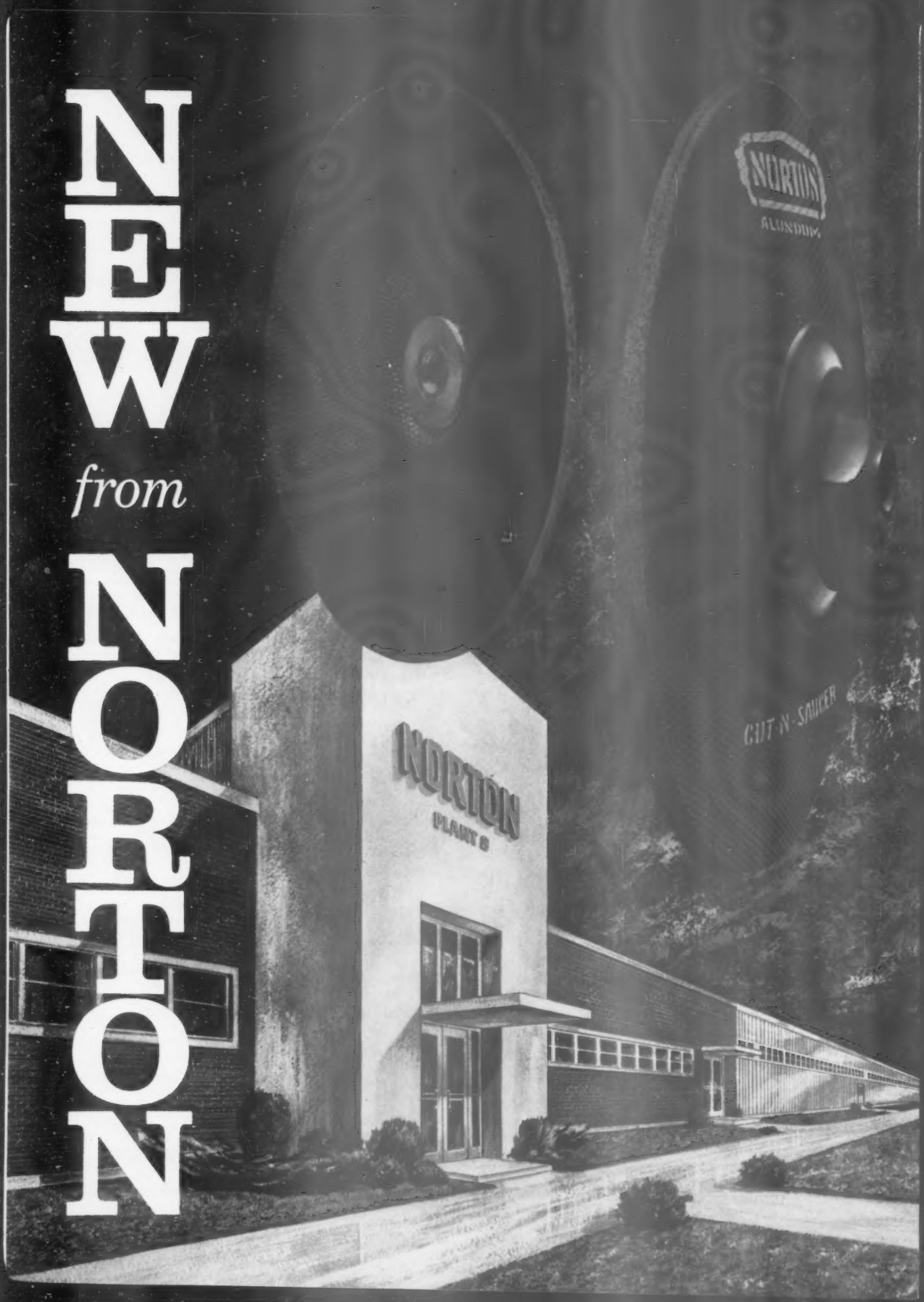
NEW *from* NORTON



CUT-N-SAUCER wheels with DIS-CARD mounts

A new combination from Norton's newest plant

For easier, faster weld-grinding, light snagging and many other portable grinding jobs, Norton now offers you:

The only reinforced wheels that combine a saucer shape with a disposable mount.

These are the new BSA Type Cut-N-Saucer wheels with Dis-Card mounts . . . available in 7″ and 9″ diameters. They are produced in the big new Norton Plant 8, built specifically to improve the manufacture and performance of resinoid wheels.

Reinforced with layers of fibre glass, BSA Cut-N-Saucer wheels gain added advantages from the new shape. Compared with straight wheels, BSA wheels on the job can be held at angles much closer to the horizontal. Results are easier control and reduced operator fatigue.

The Dis-Card mount is equally new and vital. Unlike ordinary mounts it is no separate attachment. It is permanently secured — designed to be bought and thrown away with every wheel. This means you can change wheels in seconds — completely eliminating "lock washer" action and the usual mounting routine that can take up to half an hour. So every Cut-N-Saucer wheel you buy is already mounted — and *stays* mounted, throughout wheel life.

Yet you pay no more for a Norton Cut-N-Saucer than for a conventional reinforced wheel!

Cash in on this first opportunity ever offered to you to get advantages never before combined in a single, standard priced, portable grinding wheel. For further facts on the new BSA wheels — or on straight wheels also with Dis-Card mounts — see your Norton Distributor, or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

NORTON
ABRASIVES

W-2017

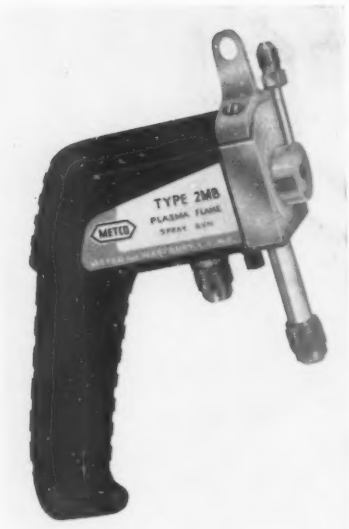
Making better products . . . to make your products better

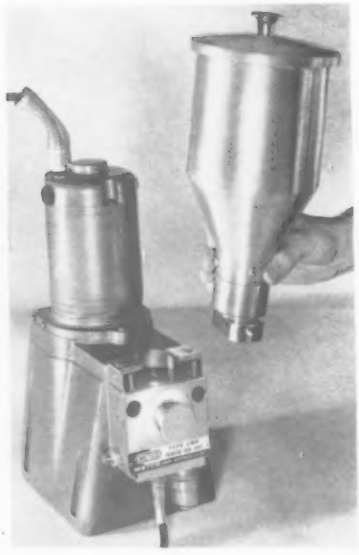
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

For more facts Circle No. 162 on Welding Info-Aid Card

For more information, fold out Welding Info-Aid card on page 73 and circle appropriate numbers as you read.

NEW PRODUCTS for you





Three-component system permits precision plasma spray coating

Improved control and plasma powder flow permit exact coating duplication. System has three components: a console with automatic controls, a spray gun (above) with one-piece nozzle, and a powder feeder (above) that permits exact coating duplication. System allows flame spray speeds of 5 to 15-lb-per-hr with deposit efficiency of 65% to 80%. Gun weighs 3¼ lb, consists of six basic interchangeable parts and handle. Nitrogen, argon or helium can be used as plasma gas. Tap water at ordinary pressure is coolant with no heat exchanger required. **Metco Inc.**

Circle No. 1 on Info-Aid Card.

Rescue breathing kit is light, portable

Portable kit is light unit for rescue breathing. Opens with flick of wrist. Contains resuscitator, foot-operated suction pump. Requires no electricity; uses normal atmospheric air. Can be operated by one person. Quickly clears mouth and throat of liquid. Resuscitator bag holds 1,000 cu centimeters of air and will deliver up to 700 cu centimeters into lungs when squeezed. This is usually more than can be delivered by mouth-to-mouth breathing but less than adult lung capacity; so there is no danger of rupturing tissues. **American Optical Co.**

Circle No. 2 on Info-Aid Card.

Oxyacetylene torch has silicone O-ring seals

Model 63-F oxyacetylene welding torch features high-temperature silicone O-ring seals for easy tip assembly changes. Mixer accommodates 12 tip sizes. Torch has 1⅛-in.-diameter handle. Comes with three tips. **The Harris Calorific Co.**

Circle No. 3 on Info-Aid Card.

Hardfacing electrode operates a-c or d-c

Hardfacing electrode is designed for surfaces subjected to metal-to-metal frictional wear or severe earth scouring under low stress conditions. Hardalloy 48 is iron powder low-hydrogen electrode supplied in ⅛-in., 5/32-in. and 3/16-in. sizes in 14-in. lengths. Each lb of electrode covers 18 to 22 sq in., ⅛-in. thick. **The McKay Co.**

Circle No. 4 on Info-Aid Card.

Welder designed for aluminum, copper bars

High-capacity flash unit welds aluminum to copper bar stock. Work is preheated, flashed and upset automatically. Resulting welds can withstand 180-deg bend tests. F-5 welder is rated as 400 kva machine at 50% duty cycle. **Thomson Electric Welder Co.**

Circle No. 5 on Info-Aid Card.

Valveless torch made for welding, brazing

Valveless torch (Style 725) is suitable for production welding and brazing. Torch assembly has no needle valves. Gas-mizer is used in conjunction with modified torch. Flame adjustment is made at regulators on gas cylinder of pipeline station. Gas-mizer, with pilot light to ignite torch, closes off fuel mixture when torch is hung on hanger arm hook. When torch is picked up, gas flow resumes. **Air Reduction Sales Co.**

Circle No. 6 on Info-Aid Card.

Power unit drills holes to 3½-in. diameter

Roto-Hammers can drill holes up to 3½-in. diameter through toughest masonry reinforced with steel rods or wire mesh. Water cooling not needed. New bits are factor resulting in lower cost-per-hole. **Skil Corp.**

Circle No. 7 on Info-Aid Cadr.

togetherness

Welding puts things together; radiography with Ansco Superay® X-ray film makes sure they'll *stay* together.

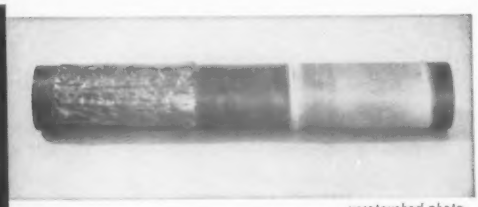
Minute flaws and defects are easily detected with Ansco X-ray films, because they have inherent sensitivity, definition and readability. They register finest detail and make interpretation fast, easy and accurate.

For low voltage applications, Ansco Superay 'A' film yields maximum detail and high contrast. When speed is not the ultimate factor, Ansco Superay 'B' is recommended for its fine grain and high contrast characteristics. Both are available in convenient standard packages or economical Superpak® containers of 300 and 600 sheets, in all sizes, including the practical 3½" x 17" size. See your Ansco representative, or write ANSCO, A Division of General Aniline & Film Corporation, Binghamton, N. Y.

Ansco
X-ray

How flame spraying can pay for itself in your shop in a very short time

ONE EXAMPLE
Hard facing time cut from 4 hours to 25 minutes



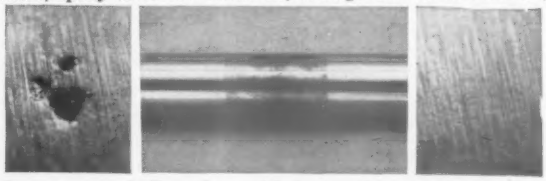
unretouched photo

The two end sections of this shaft have been built up with AMS 4775. Section at left applied by welding – time 4 hours; section at right by flame spraying – time 24 minutes, 45 seconds.

QUESTION: Look at the picture. Which end would you prefer to grind finish?

Here's the whole story. We took a 15" length of 2.5" mild steel shafting and undercut two 5" sections .050" on the radius. We then sent the shaft to a nationally-known job shop with instructions to apply AMS 4775 on the left-hand section, sufficient to finish at 2.5". Weight of welded-on alloy was 17 9/16 ounces – time spent by one of their top men – 4 hours (including preparation).

Then we blasted the second section with steel grit and flame sprayed it with AMS 4775 in powder form (ThermoSpray Powder 15E). The coating was then torch-fused. Weight of deposited alloy – 11 5/16 ounces; surface preparation, set-up and pre-heat – 12 minutes; spray time – 5.5 minutes; fusing time – 7.25 minutes.



unretouched photo, in center, shows finish-ground shaft. Insets, magnified about 50X, show pits in welded section (left) and no pits in flame sprayed section at right.

We then sent the shaft out to a grinding shop with instructions to clean up at 2.500" plus. The flame-sprayed section cleaned up at 2.510" but welded section still showed pits when grinding was stopped at 2.477" Rockwell of welded end Rc-61, sprayed end Rc-60.

Pump plunger being flame sprayed with METCO ThermoSpray® Powder Gun

These flame-sprayed coatings are solid, homogeneous; usually superior to those applied by other methods. You can apply them at high speed, with lower material and finishing costs. In addition to AMS 4775, a number of other powders – including tungsten carbides – are available for various service requirements; all may be fused–some used as sprayed for certain service requirements.

For further information on this high-speed, money-saving, hard-facing process, phone, write or wire.

METCO INC.
FORMERLY METALLIZING ENGINEERING CO., INC.
Flame Spray Equipment and Supplies

1127 Prospect Ave., Westbury, L. I., N.Y. Telephone: Edgewood 4-1300 Cable: METCO
In Great Britain: METCO., Ltd., Chobham-near-Woking, England

FREE BULLETIN

FREE BULLETIN: Send off the coupon for this and other useful information which shows how flame spraying pays for itself–in a very short time. No obligation, of course.

METCO INC.
1127 Prospect Ave., Westbury, L. I., New York

Please send me information on hard-facing by flame spraying.

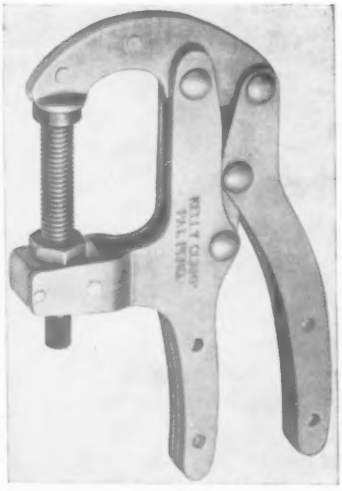
Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____



Toggle-action C-clamp has locking feature

Toggle-action C-clamp has locking feature to grip work. Easily applied yet may be released instantly. Features include electro-plated spindle with lock nut, 2,400 psi holding force. **Fast Grip Mfg. Co.**

Circle No. 8 on Info-Aid Card.

Rolling machines work either right or left

No. 460 rolling machines operate right or left and can bend pipe, tube, round bar, square bar and flat bar. Tight coils, loose coils, flat spiral coils, wide radius bends or short radius bends can be made on these machines. **Wallace Supplies Mfg. Co.**

Circle No. 9 on Info-Aid Card.

Tig outfits contain all needed tools

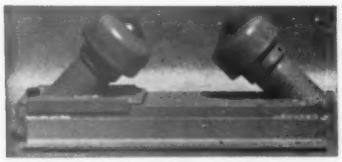
Two new welding and cutting outfits contain all apparatus needed for most average Tig welding and cutting. Both kits are packaged in specially-designed corrugated cartons which serve as shipping containers. In HW-17 kit, air-cooled torch has continuous duty welding capacity of 130 amp a-c or d-c. HW-20 kit includes water-cooled torch capable of 200 amp continuous duty a-c or d-c welding. **Linde Co.**

Circle No. 10 on Info-Aid Card.

Cutting torches operate on propane, natural gas

Universal cutting torches operate on either natural gas at city line pressure or on propane at cylinder pressures. Torches operate at any pressure from 3 oz up. Range of tips is available to provide extra-fast pre-heat for scrap yard and demolition work. **The Harris Calorific Co.**

Circle No. 11 on Info-Aid Card.



Pipe dollies feature ball bearing design

Adjustable pipe dollies have heavy-duty ball bearings to enable rotation and longitudinal pipe movement. No need to lift pipe when aligning for correct spacing. Ideal for pushing pipe thru walls or tunnels. Three heavy-duty sizes handle 2 in. thru 60-in.-diameter pipe. **Oxo Welding Equipment Co.**

Circle No. 12 on Info-Aid Card.

Thyratron tube is inert-gas filled

Inert-gas filled thyratron tube is recommended for electronic controls. The 3.2-amp d-c tube is available with lug base. NL-734/5544 tube has 2.5-volt filament rating, 11.5-amp filament rating, and 40 peak anode current rating. **National Electronics, Inc.**

Circle No. 13 on Info-Aid Card.

Cable connectors resist tension from dragging

Cable connectors with twin-wedge design resist tension from dragging. Connectors lock or unlock with simple twist. Properly mated connectors resist arcing and overheating. Electrical contact area increases with normal wear. Connectors fit all four popular welding-cable sizes, can be attached by lead soldering or crimping. Neoprene covers are not affected by oil, grease, temperature. **Ampco Metal, Inc.**

Circle No. 14 on Info-Aid Card.

Spot welder gives 6 to 330-lb pressure

Bench spot welder gives fingertip adjustment of welding pressure from 6 to 330 lb. M 33 VP has 162 current settings from 900 up to 16,000 amp by vernier regulator. Air or foot operated without change over. Completely water cooled including transformer. Variety of tip set-ups possible for wide range of applications of ferrous and non-ferrous metals. **Aro Spot Welder Corp.**

Circle No. 15 on Info-Aid Card.

Electrodes designed for cast iron welding

Two new electrodes are designed for welding cast iron. Zenith #1 is a pure nickel electrode. Zenith #2 is an electrode for welding heavy sections, alloy irons, and cast iron to other metals. Both are suitable for use in all positions, a-c or d-c. Available in 3/32-in. to 3/16-in. diameters. **Zenith Welding Products Co., Inc.**

Circle No. 16 on Info-Aid Card.

125-amp portable arc welder weighs 45 lb

Full 125-amp portable arc welder weighs 45 lb and measures 12-in. by 16 in. by 9-in. high. Model 125W will weld anything from light sheet metal to ½-in. plate. No special electrodes required. Welding range is from 25 to 125 amp in 12 heat states. Unit operates from any 115 to 230-volt a-c line with 75 volts open circuit for easy arc starting. **Bren/Weld Sales, Inc.**

Circle No. 17 on Info-Aid Card.

Circle No. 165 on Welding Info-Aid Card

STULZ MANGANESE-XL

WELDING ELECTRODES

The Finest Available!

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For high-strength joining of dissimilar carbon and alloy steels. Excellent shock resistance. Porosity free. Easily cut by oxy-acetylene. Good vertical welding. Low hydrogen. Austenitic manganese-nickel analysis.

AC-DC

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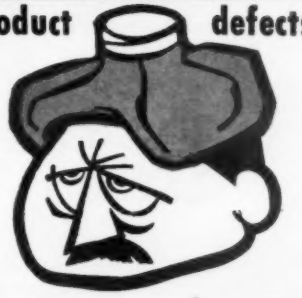
producers of famous manganal steel products

product defects



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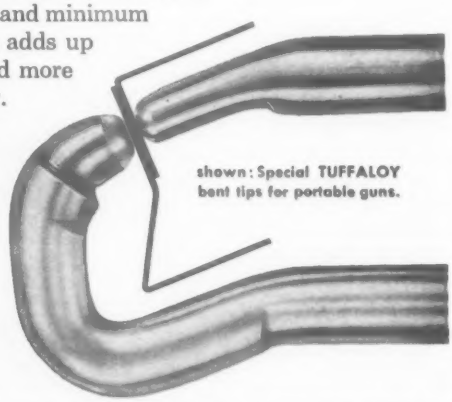
Circle No. 166 on Welding Info-Aid Card

The Strongest Bent Tips Come From TUFFALOY

You get more spot welds for your money when you buy TUFFALOY bent tips. These electrodes are bent to precise angles so skillfully that there's no sacrifice of the wall strength needed to withstand heavy forging pressures. Examine a TUFFALOY bent-tip—the diameter remains constant and the coolant hole is unobstructed. So carefully is the job done that there's no cave-in at the outside of the bend, and minimum swelling at the sides. This adds up to longer electrode life, and more spot welds for your money.



shown: Special TUFFALOY bent tips for portable guns.

Doc Tuffy says . . . *All TUFFALOY tips keep their bright and shiny look. Oxidation is inhibited by dipping the parts in a passivation solution . . . another example of our attention-to-detail that spells extra value for you.*

Write or call your nearest AIRCO or TUFFALOY distributor for more information about TUFFALOY bent tips. Many styles are stocked as standard items, and special designs are quickly made to order. Be sure to ask for the TUFFALOY Catalog.

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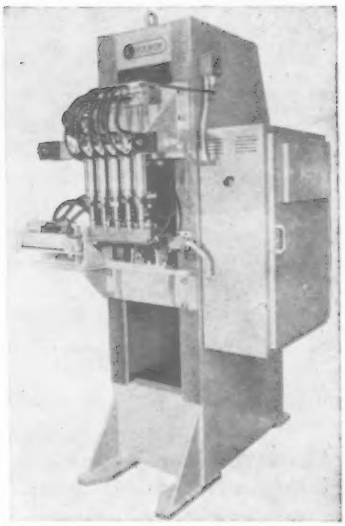
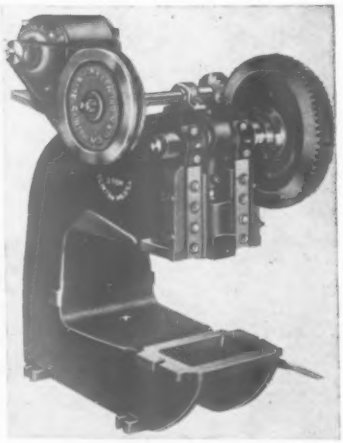


Units are both spot, projection welders

With quick tooling changes, UF-56 (above) and UF-96 welders can be adapted for use as single spot welders, press projection welders, and combination spot-projection press welders. UF-56 has pre-drilled front mounting plates for moving platens for fast change-over to new set ups. Platens on multi-spot units can be designed for 2, 4, 6, 8 or 10 air or hydraulic guns mounted in various staggered or in-line spot patterns. UF-96 will accommodate up to 22 fixture-type guns or up to three projection press heads and stations. **Kirkhof Mfg. Corp.**

Circle No. 18 on Info-Aid Card.



Punch presses have 2 to 25-ton capacity

Back geared punch presses, for deep draw, forming operations and other operations requiring special feeding, have 2 to 25-ton capacity. Presses give slow, strong strokes easily changed from repeat to non-repeat action. Strokes per minute or flywheel revolutions per minute can be reduced without sacrificing press tonnage capacity. **Alva Allen Industries**

Circle No. 19 on Info-Aid Card.

Ultrasonic spot welder has 4,000-watt capacity

Ultrasonic spot-type welder with 4,000-watt capacity has 36-in. throat depth. Model W-4,000-FSR has power source which can be remotely located. Only small interconnecting cables, 100 ft or more in length, are required between welder and power source. Ultrasonic coupling system permits greater accessibility of welding tips into hard-to-reach locations. Coupling system incorporates water-cooling for high repetition rates at high powers. Unit is effective for joining refractory metals because it involves solid state process which does not rely on parent metal melting. **Sonobond Corp.**

Circle No. 20 on Info-Aid Card.

Brazing rod features extruded flux coating

Brazing rod has extruded flux coating. Rod is low-fuming, free-flowing manganese bronze ideal for high production applications where pre-fluxed rod is required. **Ampco Metal, Inc.**

Circle No. 21 on Info-Aid Card.

Fan-cooled arc welders are 250, 295 amp units

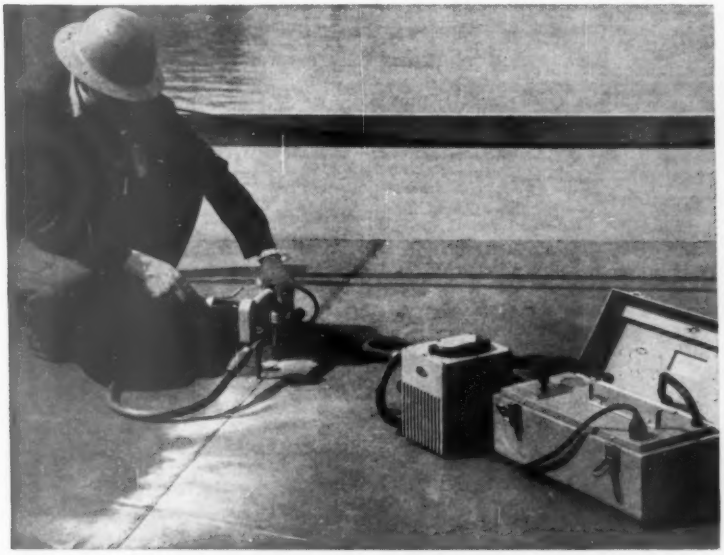
Models 41 and 42 heavy-duty fan-cooled units are 250, 295-amp arc welders respectively. Other features of two units are identical. These include: mounted rubber-tire wheels, dial control for amp setting, power-pack transformer with copper coils over laminated silicon steel core, solid steel block-type shunt, and polyester insulation. Dial light allows amp setting in dark or at night. Separately-fused 110-volt power outlet is included. **Twentieth Century Mfg. Co.**

Circle No. 22 on Info-Aid Card.

Aluminum welding, brazing wire is nuclear grade

Aluminum alloys 718, 1,000 and 4043 are available with nuclear grade chemical certification. Alloys available in spooled wire on 1-lb and 10-lb spools and cut length rods. Alloys certified to contain less than specified amount of certain unwanted elements such as lithium, cadmium, boron and cobalt. Silicon, copper and iron percentages are kept low. Applications include reactor, tank and pipeline fabrication. **All-State Welding Alloys Co., Inc.**

Circle No. 23 on Info-Aid Card.



Portable magnetic tester produces 1,000 amps a-c

One-man portable magnetic particle testing unit produces 1,000 amp a-c or half-wave d-c to detect surface and sub-surface flaws. Portable Ferroscope will fit through openings 18-in. wide. Can be used with rods or coils. Prods can be fastened for one-hand operation or used separately. Fan-cooled unit has five-place amp selector and safety limit switches. **Picker X-Ray Corp.**

Circle No. 24 on Info-Aid Card.

Circle No. 165 on Welding Info-Aid Card

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The Finest Available!

STULZ UNIVERSAL HARDFACE

Reduces need for inventory of a variety of hardfacing. All-purpose electrode used in heavy industry and mining where varying conditions of abrasion, impact and metal-to-metal wear occur. Rapidly self-hardens up to 53 R.C. Low hydrogen type. Forgeable. AC-DC

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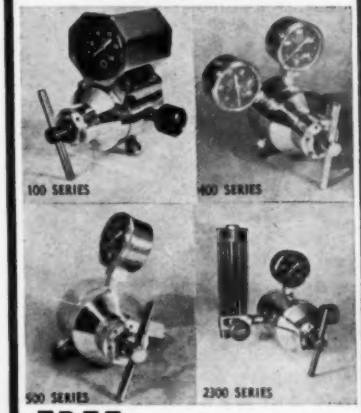
ANYWAY YOU LOOK AT IT, IT'S OXO

THE SAFEST REGULATOR MADE



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GB Silver Brazing Alloys are available in all popular diameters, in coils, straight lengths, pre-formed rings and special shapes to satisfy every requirement, as well as in strip form. Quality controls assure you that the alloys will produce a strong, economical, dependable leak-proof joining of metals. The alloys meet all Standard Specifications.

These popular Goldsmith alloys will join Brass, Copper, Steel, Stainless Steel, Monel, Inconel, Silver and Gold.

Your operator will appreciate your specifying GB Silver Brazing Alloys for their fine working qualities.

For best results, use GB #88 Flux, known for its low glare and low fuming qualities—operator comfort assured, available in the following size containers—3 oz., ½ lb., 1 lb., 5 lb. jars, and 25 or 50 lb. drums. Call your dealer today. Complete data on request.

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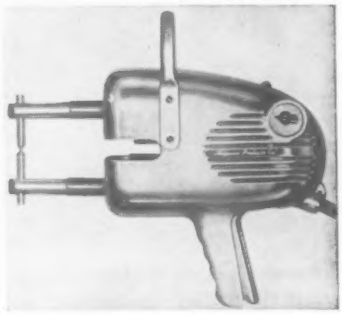
Spark lighter features special safety lock

Tripl-Flint-Lok spark lighter has simple, trigger-operated safety lock to prevent flints from accidentally sparking even when lighter is dropped. Lighter has replaceable 3-flint unit, anti-snag pocket guard and rustproof steel frame. **Modern Engineering Co.**

Circle No. 25 on Info-Aid Card.



Portable spot welder has ⅛-in. capacity

Model 55 lightweight portable spot welder has capacity of ⅛-in. combined thickness steel, mild and stainless, galvanized and cadmium plated. Unit includes built-in electronic timing control and 100-amp contactor. Power supply is 200-250 volt, 60 cycle. Weight is 26 lb. Electrodes are ½-in. diameter. **Ampower Products.**

Circle No. 26 on Info-Aid Card.

Electrode holder eliminates use of spring loading

Tong type electrode holder for manual metal-arc welding eliminates spring loading. Holder uses mechanical means of applying high pressure to the electrode by turning handle. This develops firm electrical contact between holder and electrode. Holder runs cool in 300 to 500 amp. ratings. Connection to cable is made by two large socket-set screws. **Lenco, Inc.**

Circle No. 27 on Info-Aid Card.

Ultrasonic flaw detector shows picture of cracks

Flaw detector sends sound bursts into welded plate, picks up returning echo. Under normal conditions, pattern on cathode ray tube shows series of pyramid markers. If sound wave meets obstacle, such as slag inclusion, lack of fusion, or crack, energy will be reflected and will generate vertical pip on scope at exact flaw location. B-scanning, even by hand, will find discontinuities as small as 1/16 in. **Branson Instruments, Inc.**

Circle No. 28 on Info-Aid Card.

Tempilstik°

*temperature indicating crayons**

Tempilstik°—a simple and accurate means of determining preheating and stress relieving temperatures in welding operations. Widely used in all heat treating—as well as in hundreds of other heat-dependent processes in industry. Available in 80 different temperature ratings from 113°F to 2500°F . . . $2.00 each.

Send for *free* sample Tempil° Pellets. State temperature desired . . . Sorry, no sample Tempilstiks°

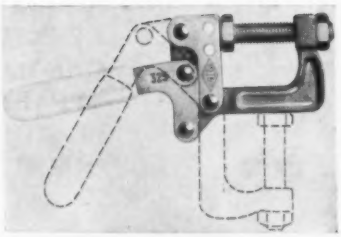
Most industrial and welding supply houses carry Tempilstiks° . . . if yours does not, write for information to:

WELDING SALES DIVISION

Tempil° CORPORATION
132 West 22nd St., New York 11, N. Y.

*Also Tempil° Pellets and Tempilaq° (liquid form)

Circle No. 170 on Welding Info-Aid Card



Toggle clamp designed to attach by welding

Medium-duty toggle clamp is designed for attachment by welding front or top of base to sides of conveyors or containers and lid edges or covers. Model 325 weighs 15 oz, has 800-lb holding pressure. Jaw of forged alloy steel moves 90 deg to clear working area. Base holes, 17/64-in. diameter, allow special mounting. Red plastic handles move 50 deg for one-hand operation. **Detroit Stamping Co.**

Circle No. 29 on Info-Aid Card.

A-c/d-c arc welder has 3-phase input

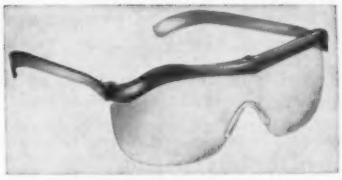
Controlarc 330 a-c/d-c arc welder has 3-phase input. Three-phase power on both a-c and d-c models provides 3-phase rectifier-type circuitry in d-c mode. This eliminates need for 3-phase single-purpose rectifier-type d-c output. Welder reduces line unbalance due to single-phase a-c loads. Unit includes plug-in gas and spot weld panels. **Vickers Inc.**

Circle No. 30 on Info-Aid Card.

Plug-in distribution system has safety-fused plugs

Plug-in distribution system for electrical resistance preheat and stress relief has safety-fused plugs to protect equipment and personnel. Three-prong plugs mate with outlet receptacles on primary distribution blocks and two-prong plugs with secondary block outlets. To prevent overloading when heaters added, plugs have fuses at each prong base, readily unscrewed for access to fuse. Fuses can be changed only after plugs disengaged. **J. B. Nottingham & Co., Inc.**

Circle No. 31 on Info-Aid Card.



Visitor's goggles are light, inexpensive

G 531 visitor's goggles are lightweight, inexpensive. Frame and temples are smoke gray acetate. Spatula-type temples. Acetate lens has clear nose pad. Temples can be imprinted with firm name. **Pulmosan Safety Equipment Corp.**

Circle No. 32 on Info-Aid Card.

Circle No. 165 on Welding Info-Aid Card

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WELDING ELECTRODES

The Finest Available!

STULZ PIERCING ELECTRODES

CUT · GOUGE · CHANNEL · PIERCE. Removes any metal: cast iron, stainless, copper, armor plate, aluminum, brass, bronze, nickel, manganese steel, monel, etc. Use on DC machines without special attachments. Leaves scale-free surface. DC

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EVEN IF YOU HAVE STANDARDIZED ON ONE MAKE OF CUTTING AND WELDING APPARATUS YOU WILL FIND OUR REGULATORS TO SERVE YOUR NEEDS WITH OUTSTANDING USER SATISFACTION.

It is understandable for large equipment users to have standardized on welding and cutting torches for interchangeability of tips and nozzles as well as replacement parts. This is sound . . .

HOWEVER—you will find our regulators of such outstanding quality, long and dependable service life, safety and pressure accuracy that you are well justified to fit them into your program.

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Of maximum importance, therefore, is the quality of the regulator, its ability to do the job well and safely and to stay on the job longer.

Don't overlook the fact that a truly fine regulator makes practically any welding or cutting torch do a better job even in the hands of the best operator.

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GROUND ATTACHMENTS

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Portable sandblaster tested for 300 psi

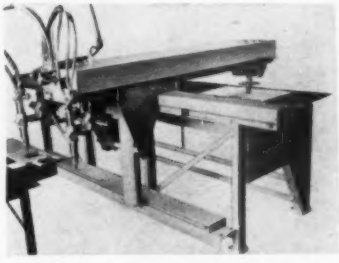
Model 28A portable sandblaster is tested for 300 psi and effectively operates on same air hook-up as any production spray gun. Unit is ⅛-in. steel, weighs 24 lb, and has 28-lb abrasive sand capacity. Unit features squeeze grip abrasive delivery nozzle allowing operator to control flow. Pressure gage and pressure relief valve are standard equipment. **Handi-Blast Div., Mahill Mfg. Co., Inc.**

Circle No. 33 on Info-Aid Card.

Unit welds metal cutting saw blades

Automatic flash welding unit welds metal cutting saw blades of tungsten or molybdenum. Unit is 4 kva featuring adjustable work clamps. F-00 has water-cooled transformer mounted in frame affording tap selection of eight heat points. Clamp exerts 1,200 lb of force at 80 psi. **Thomson Electric Welder Co.**

Circle No. 34 on Info-Aid Card.



Oxyacetylene cutter gives electromagnetic scanning

Oxyacetylene unit cuts any profile or design on metals according to drawings, templates or manual control. Sheet-steel frame front has rails for guiding longitudinal slide which has prismatically-cut large bearing surface on main rail. Driven by two commutator motors, can carry out 145-deg turns. Electromagnetic oxygen shut-off valve, motors, pilot lamps all operate at low voltage. **Netherlands Trade Commission.**

Circle No. 35 on Info-Aid Card.

Circle No. 165 on Welding Info-Aid Card

STULZ SPRAY-ROD

THIN LAYER HARD SURFACE

WELDING ELECTRODES

The Finest Available!

STULZ SPRAY-ROD

For "spray on" layers of hardfacing. Goes on fast! Hard, smooth skin to protect all steels against abrasion. Fine for edge-facing where section is important. AC-DC

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producers of famous manganal steel products

In 1936, MORT CLARK, then Vice-President of the World's largest sign manufacturer, wanted a welded galvanized sign frame. Every welder manufacturer said it couldn't be done . . . Mort Clark did it, received a check and certificate of achievement from the Lincoln Welding foundation — and

MORT CLARK'S GALV-WELD ALLOY ORIGINAL & GENUINE

WAS BORN

The Navy didn't believe, tested it 3384 hours in salt spray (100 hours is normal), then approved it. Westinghouse reports Galv-Weld roof sign, installed 1936—still perfect in 1959 —23 YEARS LATER!

TIME PROVEN - MODESTLY PRICED

WHY EXPERIMENT?

Regalvanizes corrosive seams and areas where galvanizing is burned away by welding, skipped in hot dip galvanizing, or abraded in fabrication.

Eliminates corrosion areas produced by welding, so that weld will stand up under paint, WITHOUT rust, as on ornamental iron. Simply use residual heat from welding, or reheat, wire brush, and apply. No fluxing—No fumes.

Makes every welder a galvanizer of small weldments or parts. Repairs chipped porcelain, rusted appliances, rusted auto, truck or trailer bodies, frames, fenders, or other steel products. Can be readily refinished to match surrounding surface.

Ideal for pipe joints, galvanized structures, water and fuel tanks, duct systems, cold storage lockers, sinks, drains, washers, towers, steel buildings, railings, etc.

Some distributor franchises still available. Cash in on consistent campaign now running in 18 national magazines.

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Send Information User ☐ Distributor ☐ Dealer ☐ Free Sample ☐

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City ..... State .....

Circle No. 175 on Welding Info-Aid Card

TINIUS OLSEN

The standard Charpy V-notch specimen is pre-cooled to a minus 10°F. and secured in the tester. A heavy pendulum weight is then dropped through an arc to strike the weldment. Many of the Easyarc 328 coupons stopped the pendulum cold — as shown both at the left and in the closeup view at the right, photographed at the moment of impact.

Airco's NEW class E-7018 electrode stops Charpy tester cold!

EASYARC 328—iron powder, low hydrogen electrode for mild steel

Welds made with Airco's new Easyarc 328 give you outstanding impact strength in all approved applications. The dramatic test results achieved recently in the widely used Charpy test show why—

Typical industry requirements call for a Charpy V-notch value of 20 ft.-lbs. at minus 10°F for welds made with E-7018 electrodes.

Put to this back-breaker test, the new Easyarc 328 chalked up 190 ft.-lbs. average! Many coupons stopped the sledgehammer blows of the Charpy impact tester cold!

Consider also the other plus values of Easyarc 328—Excellent usability in all positions . . . High rate of deposition . . . Low spatter . . . Easy slag removal . . . X-ray quality welds . . . Works with either AC or DC reverse polarity.

Where Easyarc 328 will help you weld better — On low alloy high strength steels . . . Hardenable steels . . . High carbon steels . . . High sulfur steels . . . Enameling steels.

Here is a "natural", too, for industrial piping, and restrained joints in thick sections of mild steel.

You are offered Airco's new iron powder, low hydrogen, mild steel Easyarc 328 as the finest E-7018 electrode on the market today. Designed to produce vertical fillets and butts with flat profile.

Contact Airco — for engineering data and samples of industry's newest Class E-7018 electrode—Easyarc 328.

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More than 700 Authorized Airco Distributors Coast to Coast

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For more facts Circle No. 176 on Welding Info-Aid Card

YOU GET MORE

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GOLD STAR SR

. . . Much more! More and better welds in less time, for one thing. You buy the welder just once . . . but every minute it's in use, it's bearing big interest in the form of increased production. More welder life too: Better basic design combines with Miller's own selenium rectifier to deliver performance, reliability and rectifier durability never approached elsewhere. And more economy too? Yes, especially more economy. That's why motor generator sets – even new ones – are being replaced daily with Miller Gold Star SR welders.

Write for descriptive literature on the Miller Gold Star SR, or see your local Miller dealer for a demonstration on the how and the why of the "More You Get With a Miller." He proves it! Also available upon request is a new and interesting pamphlet "Rectifiers for Welding" – which you should have.

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JULY, 1961
Our 45th Anniversary Year

ESTABLISHED 1916

Our noble heritage

HISTORY SHOWS that through the ages there have been 19 great nations, none whose supremacy or ascendancy lasted more than 200 years.

Is time running out for the United States?

Unless we remember why we celebrate the 4th of July and reestablish for ourselves the purposes for which our forefathers founded this nation, we may well become the twentieth member of that exclusive club.

This month is the 185th birthday of this new concept in government — a government of free people. Not many years ago everyone celebrated this important anniversary as an expression of patriotism. In recent years, however, patriotism, in some areas, has lost popularity.

As an indication, the Navy Department reports "only half of (its) recruits can explain the true meaning of the 4th of July." Navy recruits, however, are not the only ones ignorant of our heritage.

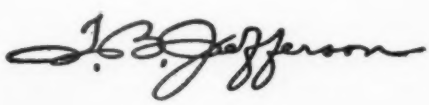
In a survey of 487,000 high school students, 84% ranked patriotism ninth in importance, following far behind fun, ice cream, dancing, football, movies, etc.

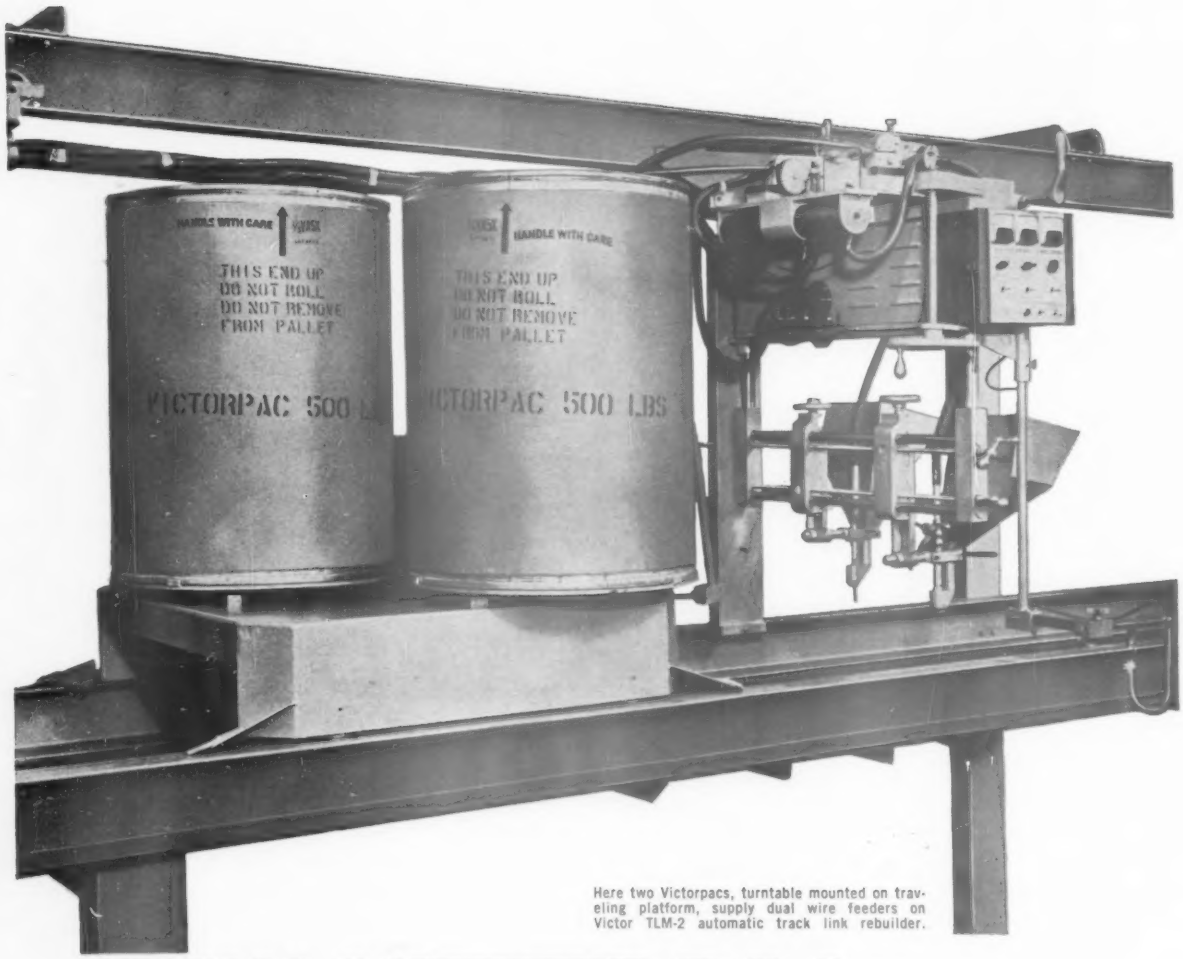
Of these, 62% felt the government owed them a living and a job; 61% that free enterprise should be regulated more closely; 56% that all businesses should be taken over by the government; 53% that the government should own all banks; 39% did not feel there should be a free press; and 34% felt that free speech should be eliminated or restricted.

For thousands of years individuals have struggled to improve their lives so every man might practice his inalienable rights. Not until this country was established in 1776 did these efforts meet with success.

Unfortunately, the character, ideals and Americanism established by our forefathers cannot be inherited. These must be reestablished in each geneation.

Have we failed to do this in recent years?





Here two Victorpacs, turntable mounted on traveling platform, supply dual wire feeders on Victor TLM-2 automatic track link rebuilder.

NEW VICTORPAC

Reduces track rebuilding costs 2 ways

Saves you 3c per pound and up to 2 hours changing coils

Now you can get Victor high quality, uniformity guaranteed VA4X, VA5X, and VA7X continuous-coil hardfacing wire in 500-lb. Victorpac containers. You pay 3¢ less per pound than for standard 100-lb. layer wound rolls. You also eliminate four coil changes and gain up to 2 hours productive time per 500-lb. Victorpac. Also available, 200-lb. Victorpac at savings of 2¢ per lb.

Works with all automatic rebuilders

Simple, low-cost turntable enables you to use Victorpac hardfacing wire with track link rebuilders, roller and idler rebuilders, grouser bar welders, or any other automatic welder. Victorpacs are easy to handle and store, keep wire clean and dry.

Why not take the easy Victorpac way to increased productivity and lower wire costs? Order from your Victor dealer now. He's your one-stop source for hardfacing wire, rebuilding equipment, welding apparatus.

VICTOR for hardfacing

Profitable dealerships open; inquire now!

H-78

VICTOR EQUIPMENT COMPANY

Alloy Rod & Metal Division
13808 E. Imperial Highway, Norwalk, California
Wakita, Oklahoma

For more facts Circle No. 178 on Welding Info-Aid Card

Radio waves, transmitted naturally by objects in space, penetrate barriers optical telescopes can never overcome. Mig, submerged-arc and manual metal-arc welding are helping to produce a gigantic antenna which can receive these waves and chart the outer reaches of space.

Giant radio-telescope will tune-in outer space

A NEW ALL-WELDED giant radio-telescope is being readied to receive radio waves transmitted from objects in outer space.

The "super ear" — in reality a hyper-sensitive antenna — is being built by E. W. Bliss Co., Canton, Ohio, for the newly-established National Radio Astronomy Observatory in Green Bank, W. Va.

This telescope will be able to pull in signals from stars so remote that their once powerful radio emissions reach us as weak signals, comparable to the output of a one-watt bulb spread over the entire surface of the earth.

The job has raised some difficult welding problems, i.e., while all components are massive, required tolerances are equivalent to those generally associated with small, precision parts.

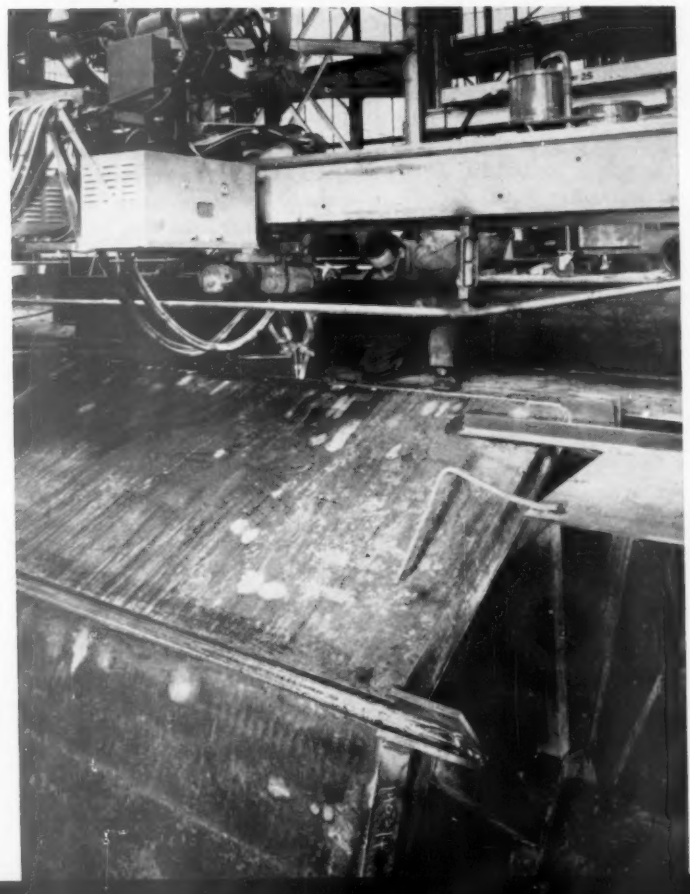
To support the 140-ft-diameter dish-type aluminum antenna, a massive superstructure was fabricated, which included 600,000 lb of 3/16-in. to 3-in. thick 5456 aluminum. The structure is so large that the gear that drives the telescope's steel polar axis shaft has an 85-ft diameter.

Edge preparation for steel components consisted of flame-cutting and some machining. For cutting, natural gas and acetylene were used at pressures from 1 to 10 lb, according to plate size and type of cutting.

All aluminum edge preparation was accomplished mechanically. There was no other pre-weld treatment except in preheating larger gage plate prior to, and during welding. After welding, all steel weldments were stress relieved.

Manual metal-arc, submerged-arc and Mig welding were all used to help fabricate the huge saucer-like structure. For manual metal-arc welding E7016 electrodes, 3/16-in. and ¼-in. in diameter, were used.

The polar axis shaft was fabricated in three sections by joining eight SAE 1018 steel plates in



SUBMERGED ARC welding unit (left) speeds welding of 15-ft-long 6-in.-thick steel plate sections from which polar axis shaft is made.

MIG gun mounted on carriage to make fillet welds on each side of aluminum beams. Carriage is guided the length of the table by wheels running in grooves machined in table.

an octagonal shape. For longitudinal welds, a dual submerged-arc welding setup was used.

The longitudinal welds—varying from 2½ in. to 6 in. in depth according to plate gage in each section — called for 100% penetration. To accomplish this with minimum expense and as fast as possible, a home-made wall-type boom was suspended between the spindles of two radial drill presses.

On the boom, two submerged arc automatic heads and controls were mounted along with a flux and wire reel assembly for each. Wire was 3/16-in.-diameter mild steel, and flux was Linde grade 80 20 XD.

Two 1,000-amp a-c transformers — one for each head — were used as power sources. Current settings were 200 to 2,000 amp at 22 to 40 volts for welding steel from 1⅛-in. to 12-in. thick.

With this arrangement, it was possible to:

1—suspend the shaft in a pit.

2—move the radial drills by crane to a platform straddling the shaft.

3—attach boom to spindles.

4—weld with wire fed through each head in tandem.

When it was necessary to change grooves, the shaft was rotated on temporary hubs fitted to each end. This was done by using an overhead crane which did not disturb the welding set up.

The radial drills permitted complete control over wire positioning since the boom could be moved in any desired direction by either one or both radial drills' feed or transverse travel.

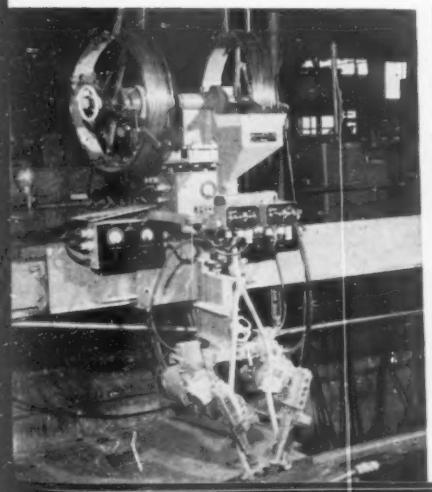
When welding was completed, the radial drills were ready for normal drilling and the boom was ready to be remounted on its wall brackets for normal use.

Ready-made I-beams, T-beams and other aluminum shapes needed for fabrication of the telescope's superstructure and reflector were not readily available.

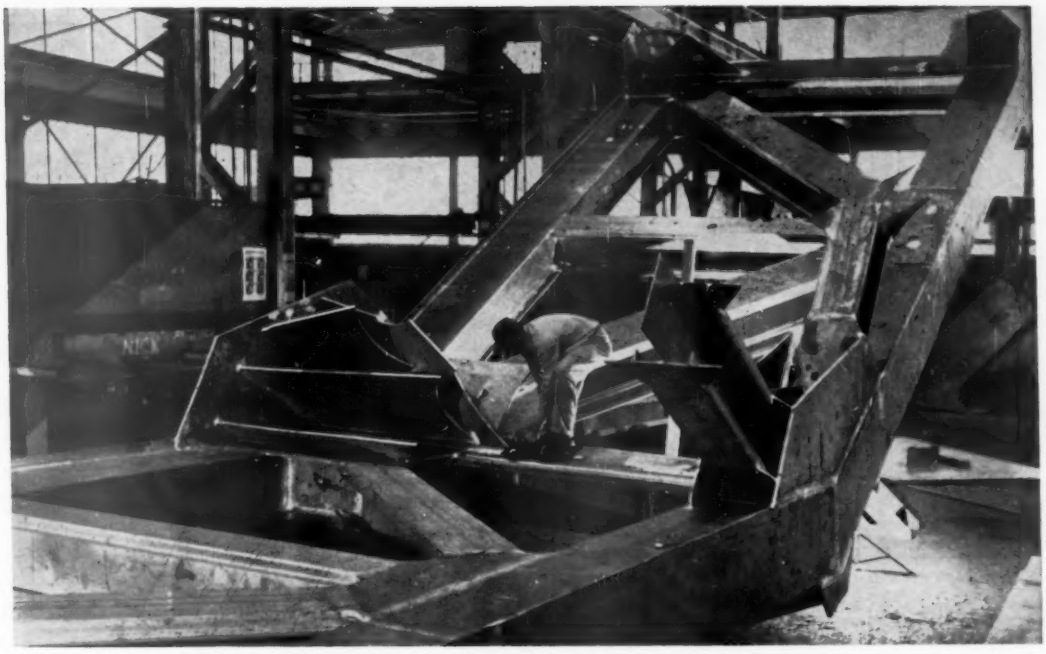
The companies supplying aluminum (Aluminum Co. of America, Kaiser Aluminum & Chemical Sales, Inc., and Reynolds Metals Co.) would have made some of the structurals on special order, but this would have required special extruding dies.

Some of the pieces were so large that even special dies would not allow them to be extruded. The cost proved too great, so Bliss decided to make all larger size structural beams.

To weld these aluminum beams quickly and cut down warping from welding heat, two Mig guns and reels and controls, mounted on separate carriages, were used. On the I-beams, the web plate was tack welded by hand in a



CLOSE up of submerged-arc welding machine (far left) shows two heads with separate wire reels. Rigid grid support for 22-ft. spherical bearing on which the telescope will rest (left) is manually metal-arc welded by E. W. Bliss Co., in its Canton, Ohio, plant.



SUPERSTRUCTURE corner, fabricated of aluminum plate and extruded structural shapes, is 13½-ft wide and each leg is 23½-ft long.

perpendicular position between top and bottom flanges.

This assembly was then clamped to the center of a metal table, and carriages were guided the length of the table by wheels running in grooves machined in the table top.

As the carriages traveled, the Mig guns simultaneously fillet welded each side. Since each gun carried its own wire reel and controls, two operators kept the carriage speeds synchronized while adjusting the controls and wire feed.

By this method, Bliss avoided distortion, which would have resulted if a weld had been applied from one side at a time.

Current settings for aluminum welding were from 200 to 600 amp at 28 to 35 volts. A 75% helium and 25% argon shielding gas mixture was used for Mig welding. Flow rate was 30 to 80 cfh. (Shielding gas consumption to date: 405,000 cu ft of helium and 135,000 cu ft of argon.)

One unusual welding problem involved sub-assembly shipments. A tunnel on the railroad shipping route between the plant and the telescope erection site had to be considered in designing all weldment sub-assemblies..

Since the dimensions of the tunnel dictated weldment size, considerable study and care was required to construct all weldment sub-assemblies in as large a size as transportation would allow.

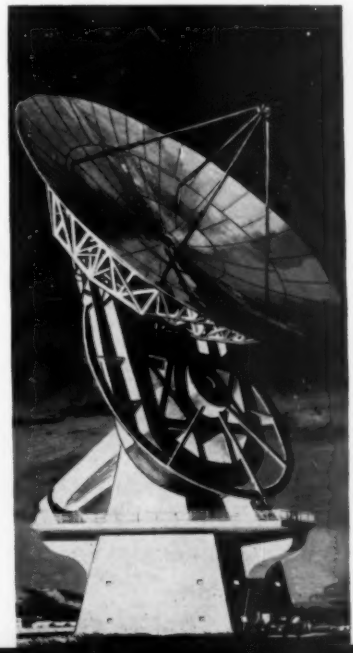
This was necessary in order to keep the number of welds in the field to a minimum and avoid the problems of open-air welding in the remote erection site.

Welds for the project were nondestructively tested by magnetic particle inspection (dry method) on the steel. Ultrasonic inspection was also used on some sub-assemblies.

Associated Universities, Inc., a non-profit organization of nine eastern universities, will operate the radio-telescope for the National Science Foundation, an agency of the federal government.

Today the most powerful optical telescopes are limited to a distance of about two-billion light years. The all-welded Green Bank instrument will be able to detect radio waves from as far away as five-billion light years.

ARTIST'S conception of completed radio telescope which will be able to detect radio waves from as far away as five-billion light years.



a special report

Part II in this series on cryogenic metals

Aluminum alloy bids for larger share of cryogenic market

ALUMINUM'S SHARE of the cryogenic market, according to authorities in the field, is expected to expand to 30 million lb per year by 1965.

With its yearly share of the market now estimated at more than 3 million lb, that is an increase of almost 1000% in less than five years.

Even considering the vast inroads aluminum has made in all metal-using fields, this anticipated expansion would seem abnormally high — but not for aluminum manufacturers.

Why this high optimism in a market dominated by stainless steel and recently invaded by 9% nickel steel?

The answer: 5083 aluminum alloy.

One of the newest and strongest of the aluminum-magnesium-manganese alloys, it offers a combination of those properties required for cryogenic service: good weldability and weld ductility, plus resistance to corrosion and stress concentration.

Since high-strength materials may be subject to brittle fracture under certain conditions, ductility at low-temperatures is a major concern.

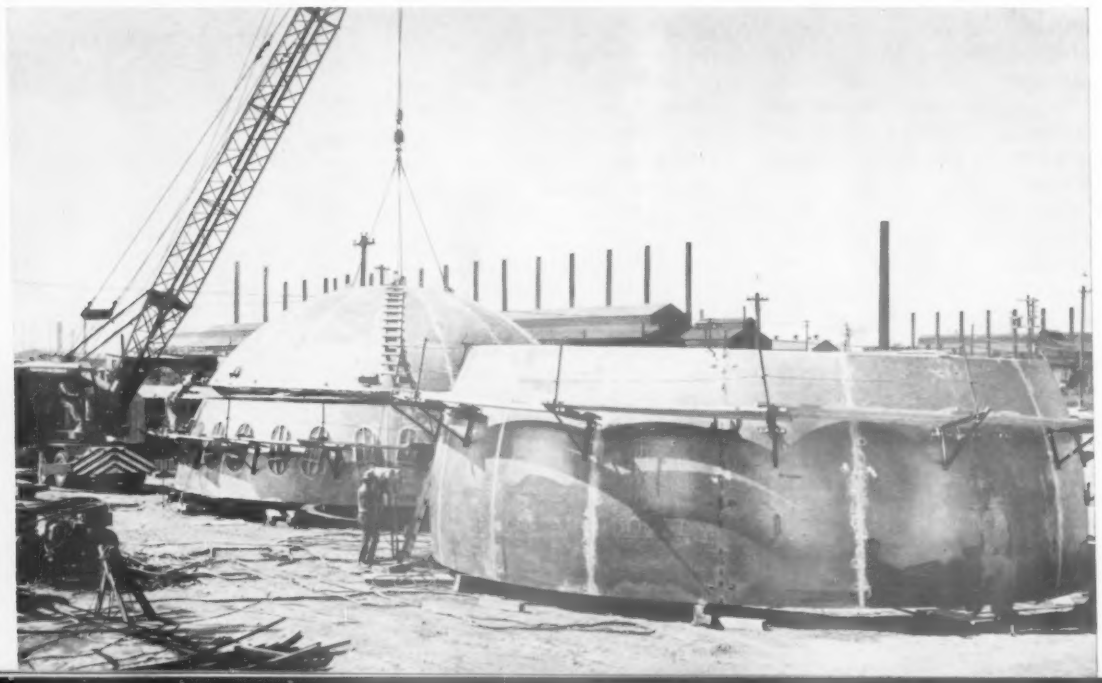
An extensive battery of tests, however, has proved that at temperatures as low as —320 F, 5083-H113 aluminum alloy plate and welds made with 5183 alloy filler can be used without fear of ductile-brittle transition.

The 5083-H113 aluminum alloy plate was used for the study because its temper is much stronger than the annealed 5083-0. And since the latter is a softer, more ductile-tempered plate, it would be at least equivalent to the H113 in brittle fracture resistance.

Plate thickness of ¾ in. was chosen because it is representative of the majority of 5083 heavy plate. Furthermore, it required multi-pass welding, typical of field welding procedures.

The test plates were Mig welded using a 3/32-in.-diameter filler wire with argon as the shielding gas. Joint design was a 70 deg included angle butt-joint with a 1/16-in. land and a 1/16-in. root opening.

Three face passes were deposited; the joint was



ALUMINUM sphere nears completion at Colorado Fuel & Iron Corp.'s on-site oxygen plant in Pueblo. Weighing 13 tons, sphere stores liquid equivalent of 25 million cu ft of oxygen at —300 F. Plate is ½ in. thick.

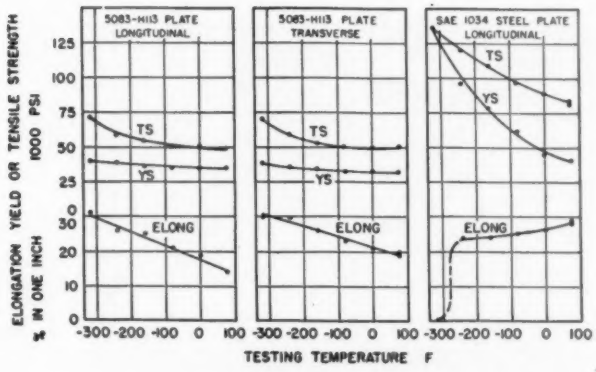
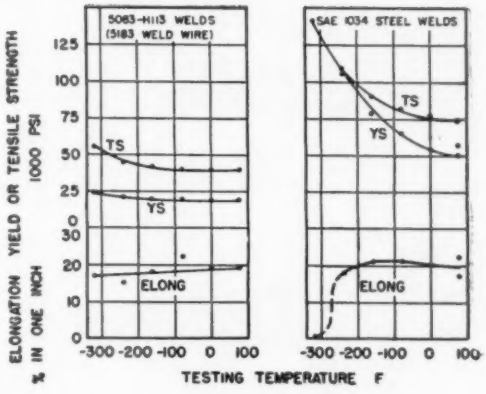


Fig. 1 (right) shows low temperature tensile properties of ¾ in. 5083-H113 plate and 1034 steel. Fig. 2 (at right, below) shows transverse tensile properties of 5083-H113 welds and 1034 steel.



then back-chipped and completed with a single root pass.

All radiographed welds indicated almost complete freedom from porosity or inclusion-causing spots. Areas having imperfections were avoided when specimen blanks were cut.

Four tests were used to evaluate the brittle fracture resistance of 5083 plate and its welds: tensile tests, unnotched and notched tensile impact tests, and Charpy keyhole impact tests. In each, temperatures ranged from 75 to —320 F.

To demonstrate the effectiveness of the various tests in producing a ductile-brittle transition, tests were also made on plate and welds of plain carbon, SAE 1034 steel.

Tensile test results are shown in figures 1 and 2. The decreasing temperatures on the 1034 steel (figure 1) caused effects which were typical for ductile-brittle materials.

The steel's yield and tensile strengths were sensitive to testing temperature changes, and increased as temperatures decreased. Yield strength increased more rapidly, however, and as it approached tensile strength, elongation suddenly decreased to almost zero. The ductile-brittle transition occurred between —240 and —320 F.

Yield strength and tensile strength of 5083 also increased with the decreasing temperature. However, the change was relatively small, and tensile strength increased more rapidly.

Thus, there was an increasing separation between the two strength properties at low temperatures and increased elongation. A similar pattern appeared in the tensile tests transverse to the welds (figure 2). In this case, however, elongation of the 5083 plate and 5183 weld deposit decreased slightly as temperature decreased.

This change in behavior, between plate and welds, was associated with (*1*) localized deformation caused by differences in the flow stresses of plate and weld deposit, and (*2*) inherent properties of the weld deposit's cast structure.

Although elongation of weld specimens did not increase as temperature decreased, the smallest elongation found was greater than the longitudinal elongation of the plate itself at room temperature. There was no ductile-brittle transition in either plate or welds.

In the unnotched tensile impact tests the increased strain rate did not produce a ductile-brittle transition in either the 5083 plate or its welds. In all cases the energy absorbed by this alloy increased substantially as temperature decreased. Tests also revealed no significant difference between longitudinal and transverse plate properties.

Notched specimens, however, are the best indicators of notch sensitivity, since a smooth specimen may show amazing ductility at low temperature.

In the notched tensile impact tests a ductile-brittle transition was not produced in either the 5083 plate or its heat-affected zone, nor in the 5183 weld deposit. Plate properties were virtually insensitive to testing temperature.

In the Charpy keyhole impact tests (most likely to produce a ductile-brittle transition in fracture-susceptible material) the results were the same as in the tensile impact tests.

These tests clearly show that 5083-H113 aluminum alloy plate or 5183 weld deposits are not prone to brittle fracture at temperatures ranging down to —320 F.

With these properties to recommend it, plus its advantages of corrosion resistance, lightweight and resulting economy, 5083 aluminum has a vast potential in the cryogenic field.

(*For a reprint of this article, circle number* 249 *on the Welding Info-Aid Card, page* 73).

EACH scoop of this loader tends to wear away the bucket. Beads of hardfacing last up to 15-20 *times longer than mild steel.*

How to deposit hardfacing alloys

AFTER ANALYZING the particular hardfacing job, (*see May WE*) and selecting the proper electrode (*see box*), the final step is to deposit the alloys.

Preparation of the workpiece, however, is an important part of any hardfacing application and must be considered first. This includes cleaning the workpiece, preparing the surface, filling depressions, buildup, and preheat when required.

Some applications do not require all of the above steps; others demand close attention to each detail.

Rust, grease, oil and dirt must be removed from the work before welding begins. If they are not, porosity may occur in the weld metal and reduce the quality of the particular hardfacing application.

Some base metals work-harden, squash-over or crack in service, and their surfaces should be repaired prior to depositing the hardfacing materials.

One method is to grind off the top thin layer of worn out metal. Another is to deposit a layer of mild or low-alloy steel on the part before proceeding with further hardfacing.

In some cases, a slight preheat is sufficient to insure proper fusion without additional surface preparation. Major cracks, however, should be cut out and repaired before any hardfacing is done.

Some areas of working surfaces spall or wear away faster than other portions. If an even surface is desired on the finished part, these depressions must be rebuilt before applying the hardfacing deposit.

Buildup consists of a low-alloy deposit between the original surface of the part and the higher alloy hardfacing, and is used because it is not advisable to use more than two layers of hardfacing material.

CRANE magnets take much pounding and considerable abrasion. Hardfacing on the magnet's impact areas resist wear and extend its service life.

The buildup material is applied on excessively worn parts to bring them to within 3/16 to 3/8 in. of the finish size.

The base metal of some parts is such that the part itself may fail from the thermal shock of welding. Or it may create brittle areas, particularly in the heat affected zone, which may fail due to shrinkage stresses and/or stresses incurred during service.

To satisfactorily weld these steels so that failure does not occur, preheat is used.

With very hard steels having high internal stresses, preheat tends to relieve the stresses and reduce the effect of welding's thermal shock.

On any hardenable alloy steel, preheat slows the cooling rate so that there is less opportunity for the formation of brittle structures. It also provides a more uniform cooling so that fewer stresses are built up in the part.

Always be sure that any part being hardfaced is at least 75 to 100 F. In the summer this is seldom a problem since the ambient temperature is well above the minimum.

In the winter, however, when parts are brought in from outside (or even if the temperature in the shop is allowed to drop below 75 F), running a flame-torch over the part is quick insurance that it will be up to the desired temperature.

Generally, preheat should not be used to eliminate cross-checks or hairline cracks which run across the beads of higher alloy hardfacing materials.

These fine cracks are often beneficial since they relieve shrinkage stresses and help avoid more serious cracks in the part. Some hardfacing electrodes are designed to cross-check and may do so even with preheats approaching 1,200 F.

Other than taking the chill off a part, preheat is not normally required except for alloy steels or very thick parts. Thus, the higher the alloy content and the thicker the metal, the greater the need for preheating.

The following rules of thumb can be applied:

(1) It is not necessary to preheat mild and medium-carbon steels except on very heavy parts.

(2) Preheat high-carbon and medium-carbon high alloy steels.

(3) It is frequently advisable to preheat large 12-14% manganese steel parts with locked in stresses to about 200 F. However, part temperature should never exceed 500 F.

(4) Always preheat cast iron slowly and uniformly to 500-700 F.

(5) When in doubt, preheat to 500-700 F and cool slowly, but always be sure the part is not manganese steel.

Normally, unretarded cooling in still air at room temperature is adequate. Occasionally, however, on jobs where undesirable cracks occur during cooling, it is advantageous to reduce the cooling rate by postheating or by covering the part with asbestos or sand while it cools.

The technique used to deposit the hardfacing material influences both the part's cooling rate and the work's alloy content.

Small beads made with small diameter electrodes and low currents have the fastest cooling rate and the least admixture with the base metal. Conversely, single layer deposits made with high currents, large diameter electrodes and large beads have the greatest amount of admixture and the slowest cooling rate.

Thus, depending on how cooling rate and admixture influence the deposit of a particular electrode being used, procedures may have considerable effect on the final properties of the hardfacing deposit.

(*For a reprint of this article, circle number* 250 *on the Welding Info-Aid Card, page* 73.)

Proper electrode selection

Desired resistance, characteristics	Material groups in performance order*				
Abrasion	3b	3a	1b	2	1a
Corrosion	2	1b	1a	3a	3b
Erosion	3b	3a	1b	2	1a
Galling	3a	3b	2	1b	1a
Impact	1a	1b	2	3b	3a
Smooth	2	1a	1b	3b	3a
Hard	2	1b	1a	3b	3a
Thin	2	1b	1a	3b	3a

*Group 1 — Ferrous alloy group
a — Less than 20% alloying elements
b — More than 20% alloying elements
Group 2 — Non-ferrous alloy group
Group 3 — Diamond substitute group
a — Rod and powdered forms
b — Insert form

Source: The Welding Encyclopedia

All data and photographs courtesy The Lincoln Electric Co., Cleveland.

15 ways

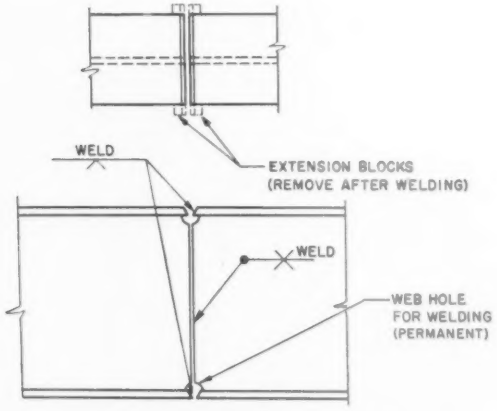
to reduce short span steel bridge costs

WELDED DESIGN AND PROGRESSIVE construction methods can significantly reduce the costs of short span steel bridges.

By specifying welding, today's bridge designers can achieve far more with each dollar — to include more projects within a fixed budget.

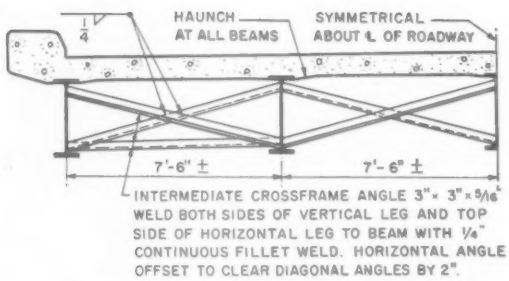
Here are 15 ways the American Institute of Steel Construction has found to reduce the cost of short span steel bridges without the least sacrifice in quality.

1 **Design for welded construction** wherever possible, particularly for spans over 50 ft. Elimination of the riveted or bolted attachment of stiffeners, diaphragms and material for shop splices results in simplicity of detail which means reductions in weight and fabrication cost.



Field welded beam splice

2 **Although past practice** has been to require riveted or high-strength bolted field splices, recent studies show that welded splices may have an overall advantage, from the standpoint of both fabrication and erection, when other field connections are welded.


1/4
HAUNCH AT ALL BEAMS
SYMMETRICAL ABOUT ℄ OF ROADWAY
7'-6" ±
7'-6" ±
INTERMEDIATE CROSSFRAME ANGLE 3" × 3" × 5/16"
WELD BOTH SIDES OF VERTICAL LEG AND TOP SIDE OF HORIZONTAL LEG TO BEAM WITH 1/4" CONTINUOUS FILLET WELD. HORIZONTAL ANGLE OFFSET TO CLEAR DIAGONAL ANGLES BY 2".

Half transverse section

3 **Transverse bracing** in its simplest form may consist of angles welded directly to the webs of stringers. Note the absence of top struts and the use of a bottom strut in the outer panel only.

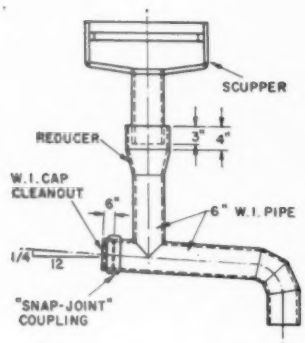
4 **Welded stud shear connectors** are recommended for composite design for their ease in field assembly. To keep the number of studs to a minimum, design should permit use of largest studs available.

5 **ASTM-A36 steel** should be used wherever weldability is a factor. Replacing conventional ASTM-A373 with this new weldable steel can result in savings of $2 to $6 per ton.

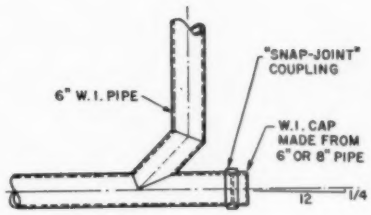
6 **ASTM-A36 steel** should also be used instead of ASTM-A7 for main structural supports in spans 20 ft and up. Its 10% increase in allowable stress secures an average weight saving of about 6% and a total cost reduction of about 3% to 5%.

7 **Use new lightweight** wide-flange sections covering the entire range of nominal sizes customarily used in beam spans. These new sections provide greater selectivity in design and, in place of former minimum sections, provide savings of over 10%.

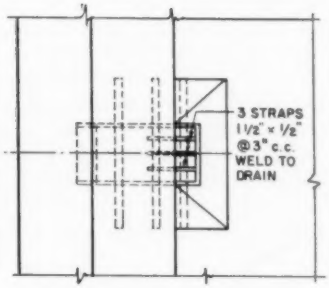
8 **Design for composite** beam and slab action. This is particularly advantageous in reducing the depth of longer simple spans and continuous bridges. Shallower floor systems provide greater underpass clearances, decrease approach enbankment costs and reduce weight of structural steel up to 30%.

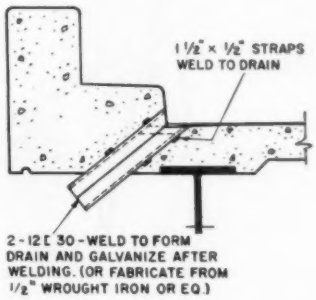


Connection at scupper



Underground connection

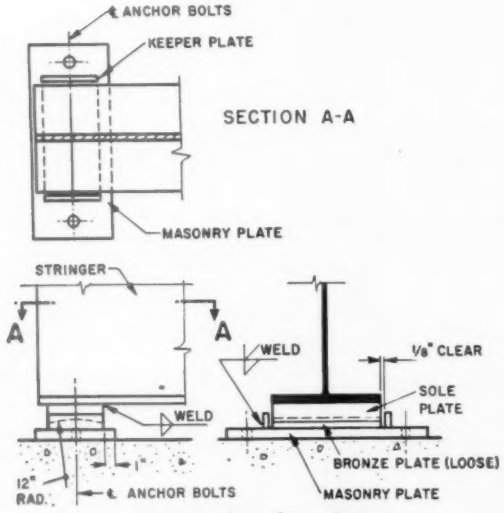




Drain pipe detail

9 **Welded drainage** details simplify design and eliminate expensive castings. Drains not requiring connection to sewers may be combination scuppers and conduits of a variety of designs, none of which need be connected to supporting steel. Larger drains requiring connections to sewers may be made of wrought iron pipe with corrosion-resistant weldments for scuppers. Note the "snap-joint" couplings for easy removal for cleaning.

10 **For low bearing pressures** where deflection is not a problem, a simple steel plate, serving as both sole and masonry plate, is adequate for both fixed and expansion shoes on spans up to 50 ft.



Expansion bearings (Spans over 70 ft)

11 **Adequate expansion bearings** for spans over 70 ft can be achieved simply with bronze sliding rocker plates. Welded keeper bars at the sides prevent lateral movement.

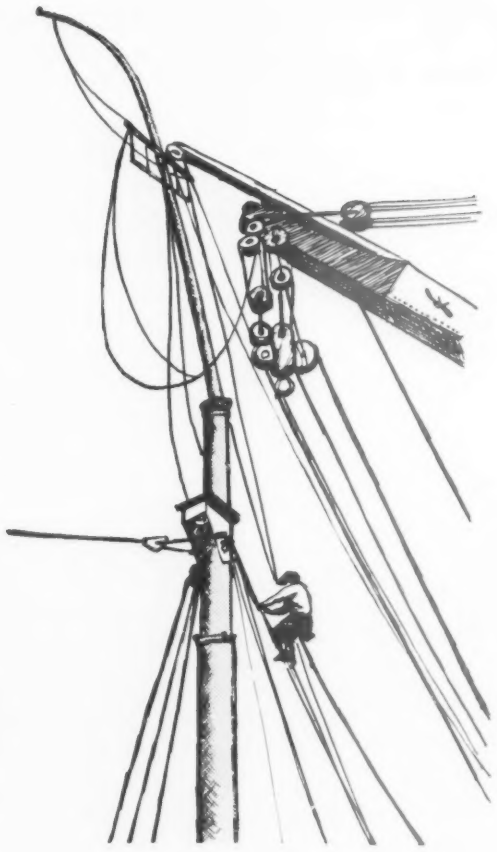
12 **Where metallic shoes** are preferred and deflection is a problem, fixed bearings with a combination masonry plate and rocker are applicable for spans of 50 ft to 100 ft. A wide slot in the keeper plate will provide an adequate expansion bearing for spans 50 ft to 70 ft.

13 **Elastomeric pads,** properly designed for bearings and expansion, furnish efficient, rugged bridge shoes at a considerable saving in cost for bridges up to 100-ft span.

14 **Long series of heavy** simple spans can be replaced by more efficient continuous spans with weight savings of as much as 15% to 30% or more.

15 **Use concrete diaphragms** at abutments for a threefold advantage: (1) It eliminates the frequently troublesome structural diaphragm. (2) The top forms an adequate support for the approach slab. (3) The concrete diaphragm, sealed at the bottom, replaces the conventional abutment backwall.

BENT topmast on Admiral Dewey's flagship is removed from mainmast. Tapered section is 57 ft long and 10 in. in diameter at bottom.



No job shop, but . . .

Ship repair firm leans heavily on welding

by **F. T. Tancula** . . . *Editor*

"EVERYTIME you turn around, you're welding something."

Thus did Joseph G. Cannon succinctly describe the activities of his ship and engine repair firm — the Port of Philadelphia's largest.

Cannon is president of A. Moe & Co., Inc., which is not a welding firm as such, but which does as much repair welding as most large maintenance departments. This includes application of the gas, arc and Tig processes. A large machine shop complements welding activities.

Ship voyage repairs call for diversified talents. Cannon's men have them. Their work includes welding pipe of all diameters aboard ship, replacing badly corroded plates and ladders, fabricating new replacement parts and rebuilding pumps and motors.

A typical job involved fabricating 15 nose cones for chutes used in loading scrap iron aboard ship. Six formed segments of ¾-in. abrasion resistant steel plate comprised each cone. Edges were double beveled to an included angle of 45 deg, with a small land. First, two passes were laid with 5/32-in. E6010 electrodes at 150 amp, followed by three passes with 3/16-in. E6024s at 200 amp.

Lifting eyes were welded to the cones with E6012 electrodes. Power source was a motor driven welder.

Working aboard ships in the Delaware River can present its problems. Most of the welding on board requires a fire watch. Tankers are especially hazardous. In addition, before proceeding, work must be approved by the Coast Guard, American Bureau of Ships and/or Lloyd's Register of Shipping.

Cannon estimates that about 60% of the ships he deals with fly foreign flags. Most of these are diesel driven, whereas the American ships his crew work on are turbine driven.

But the most renowned ship Cannon's crew worked on is neither diesel nor turbine driven. It is the now powerless, but still famous, cruiser *U.S.S. Olympia,* Admiral Dewey's flagship at the Battle of Manila Bay.

While being towed to its new permanent berth at Chestnut Street, the ship's two topmasts were bent when they struck the girders under the Benjamin Franklin bridge.

The Moe Co. crew flame-cut the masts, which were lowered to water level and shipped to the

ARMY surplus amphibious duck (DUKW) delivers newly fabricated replacement part for tanker at anchor in Delaware River. Moe has two access points on waterfront. The duck normally carries a 300-amp welder and an oxyacetylene cutting outfit for aboard-ship repairs.

shop for flame-straightening. These topmasts had been welded into sockets of the fore and aft mainmasts in an earlier renovation of the historic warship.

But getting the topmasts down wasn't as easy as it sounds. The Moe crew, as well as workers from the Independent Towing Co. and Merritt-Chapman & Scott Corp., were frustrated in their first attempts to bring down the masts.

Although the floating derrick crane used on this job was the tallest in the Port — 96 ft — it wasn't tall enough to reach the point at which the steel topmasts were joined to the mainmasts. Each mainmast is 110 ft above the water line, and each topmast is 57 ft long, making the *Olympia* tower 167 ft above the river.

A 15-ft jib was erected and connected to the crane. Riding in a bosun's chair, a Moe crewman was able to fasten the rigging and cut both topmasts from their sockets.

The masts were straightened with heat and tension, then manual metal-arc welded using 5/32-in.-diameter E6010 electrodes at 250 amp. Current was supplied from one of Moe's portable gasoline driven welders.

Work by the Moe firm, as well as that of the other two, was donated.

The *Olympia,* a popular tourist attraction, is owned by the "Cruiser *Olympia* Association, Inc." — a non-profit organization which publicly expressed its gratitude to the three firms for their patriotic assistance in repairing the damaged historic warship.

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STILLS from US Steel Corp.'s new film demonstrate proper techniques of welding T-1 steel by submerged arc (above, left), manual metal arc (above) and Mig (left).

New film shows how to weld T-1

"To SUCCESSFULLY weld T-1 Steel it is necessary to follow only three basic welding rules . . . "

These narrated words introduce a new United States Steel Corp. 16mm color-sound film titled "How To Weld USS T-1 Steel." The 18-minute motion picture is based on a booklet with the same title. Part of the booklet appeared in an April, 1960, WELDING ENGINEER article.

The film stresses these three rules for welding T-1:

1—use the right electrode.
2—use the right welding heat.
3—use the right procedure.

Low-hydrogen electrodes are necessary in welding T-1. These electrodes should be baked and kept dry.

Since rapid cooling is required by T-1's internal structure, proper heat selection is necessary. To control heat selection, US Steel provides a Welding Heat Input Calculator, accompanying the booklet.

This calculator determines how much heat goes into a joint when amps, volts and arc speed are known. A heat input table on the back of the calculator gives suggested maximum heats.

Since too slow a speed can overheat T-1, a straight forward stringer bead is recommended for maximum effectiveness because of its low heat input.

For the same reason, low heat input, arc-air back gouging followed by clean up grinding is recommended over oxyacetylene torch gouging.

For tack welding on T-1, joints must be preheated and tack welds must be big enough so they will not crack when cooling. The tacks must also be cleaned before fillet passes are made to assure clean roots.

In addition to a more detailed account of these points — complete with examples — the film contains suggestions for inert gas, submerged-arc and manual metal-arc welding of T-1 to preserve its strength and toughness.

Those interested in borrowing a print of the film should write to United States Steel Corp., Room 6341, 525 William Penn Place, Pittsburgh 30, Pa.

HOW TO SOLVE WEAR PROBLEMS *with CONFIDENCE*

Most problems of equipment wear are complicated by several wear factors, such as impact, abrasion, heat and corrosion. Choosing the best alloy for any set of conditions requires long experience plus an adequate selection of materials. Here's why STOODY, pioneers in hard-facing, gives you more for your hard-facing dollar and eliminates costly experimentation.

- **STOODY** is the only manufacturer that makes a complete line of hard-facing and build-up materials for manual, semi-automatic and fully automatic application.
- **STOODY ALLOYS** are time-tried cost savers; eliminate the need for frequent replacement parts, reduce plant downtime and keep all wearing parts operating at peak efficiency.
- **STOODY APPLICATION PROCEDURES** are the accumulative results of constant testing on the job. Proven procedures are carefully illustrated step by step and published for your use, making duplication easy.
- **STOODY** backs up its entire product line with over 40 year's specialization in the hard-facing industry. No other hard-facing manufacturer can offer equal experience.
- **STOODY** maintains a staff of qualified field engineers ready to help you solve wear problems on your own equipment in your own plant. Their knowledge is yours for the asking.
- **STOODY ALLOYS** are readily available everywhere. Over 750 STOODY dealers serve all parts of the United States as well as industrial centers of Canada and Mexico.

With *more* hard-facing alloys, *more years* of experience, *ready product availability* in all locations and a working staff of *trained field engineers* covering the nation, STOODY serves *all* your hard-facing needs faster, more specifically and with greater satisfaction.

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STOODY 1030	TUBE BORIUM
STOODY 21	TUBE BORIUM 30-Down Screen Size
COATED TUBE STOODITE	TUBE BORIUM "G"

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For more facts Circle No. 180 on Welding Info-Aid Card

Giant steel "cans" line hydroelectric power tunnels

MAMMOTH 24-FT.-DIAMETER welded steel liners are being used to help build the Oahe Dam near Pierre, S.D.

Seven hydroelectric power tunnels — each about 2,200 ft long — are being lined with the 40-ft-long, 60-ton liners. These tunnels will channel the Missouri River to generate about 3 billion kilowatt hours of electrical energy each year.

To provide material for the 449 liner sections needed for the tunnels, United States Steel Corp. plants in South Chicago and Gary have rolled about 20,000 tons of steel plate.

The plate is received by rail at the dam site and stored. When it is needed, a derrick places the plate in open-top buildings where submerged-arc welding with medium carbon steel wire forms two plates into "cans".

Completed cans are lifted from the buildings and lowered through a removable roof into a larger building where manual metal-arc welding, using a 400-amp power source and E7018 electrodes, joins them into sections.

Using iron powder E6024 electrodes, stiffener rings are then welded to the outside circumference of the sections. These sections are then placed on timber rails for rolling to the storage area.

When they are needed at the tunnels, the sections are lifted on tractor-trailers and hauled to the tunnel mouths. Here they are placed on a dolly which transfers them to a track on which a diesel engine pushes them inside the tunnels.

The liners are then fitted to preceding sections and joined by interior manual metal-arc welding against an outside backup bar. Again E7018 electrodes are used with a 400-amp power source.

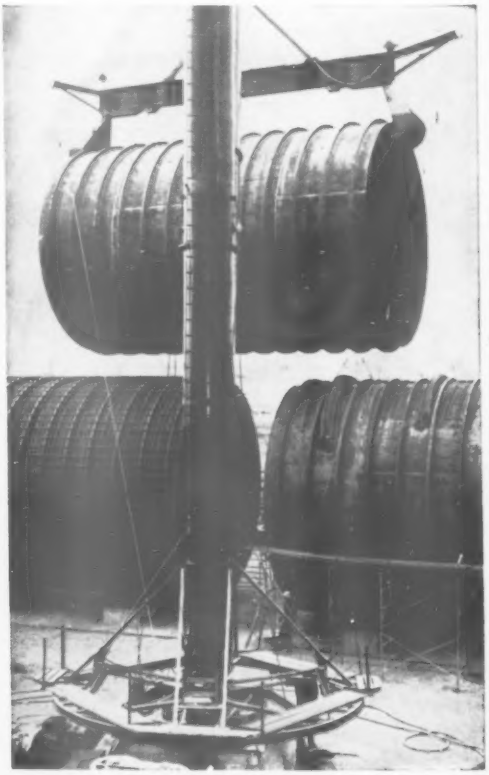
A hydraulic jacking system assures correct roundness tolerance of one section to the next before they are welded. All welds are then 100% X-rayed.

As each tunnel is completed, the upstream ends are sealed with a steel test head installed at the fabrication area. The downstream tunnel opening is also sealed and the entire tunnel liner unit is hydrostatically tested to 120 psi.

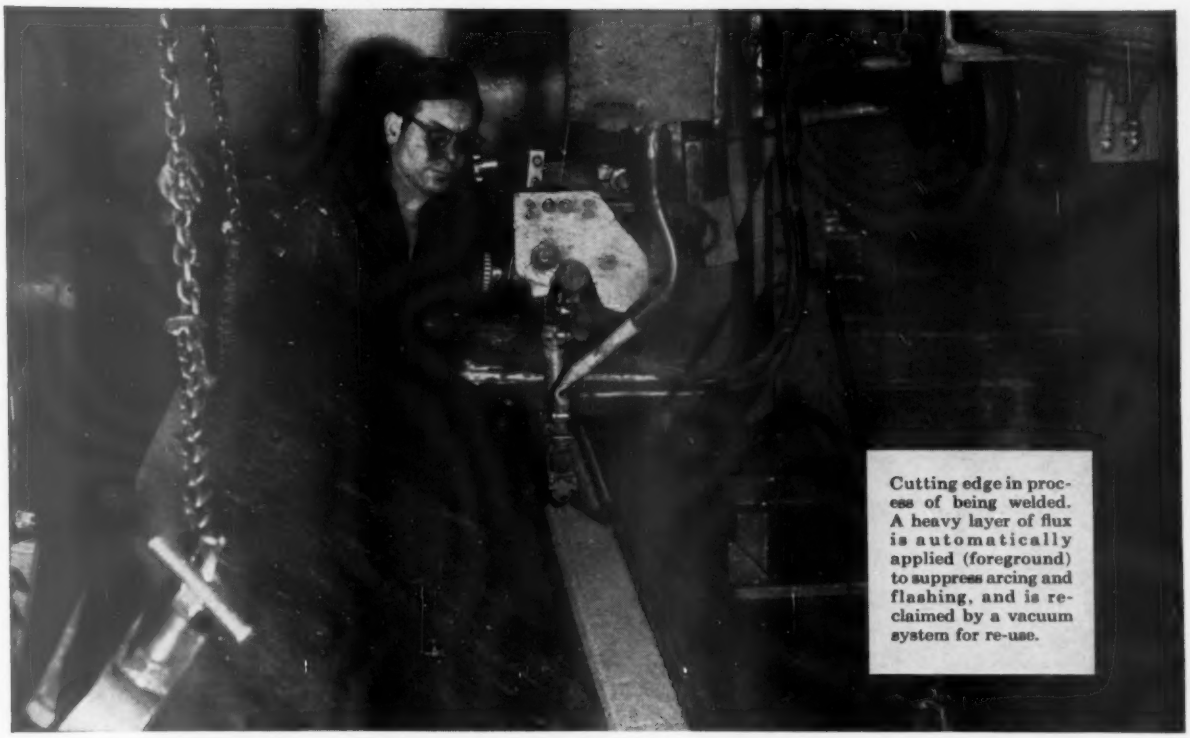
When the dam is completed in 1964, it will be capable of providing enough electrical energy through these tunnels to meet the needs of a city of about 1 million people.

In addition, the 9,300-ft long and 242-ft-high dam will create a reservoir which will extend 250 miles upstream and have a maximum depth of about 200 ft with a 376,000-acre surface area.

The Oahe Dam and its welded steel tunnels will be a key unit in a comprehensive government plan for developing the Missouri River Basin.



IT will take 449 of these giant steel "cans", at right, to channel water through seven hydroelectric power tunnels at the Oahe Dam now under construction near Pierre, S.D. An automobile, below, looks like a toy inside one of these 24-ft-diameter steel sections welded on site under controlled temperatures in a special fabricating shop.



Cutting edge in process of being welded. A heavy layer of flux is automatically applied (foreground) to suppress arcing and flashing, and is reclaimed by a vacuum system for re-use.

On heavy-duty buckets at Clark Equipment

ONLY PAGE WELDS HOLD!

At the Construction Machinery Division of Clark Equipment Company, Page A-S-18 welding wire is used to weld cutting edges to bottom plates of buckets for the largest Michigan Tractor Shovels. That's because it was found that welds made with other wires would break unless the steel had been pre-heated. With Page A-S-18, steel can be moved from outdoors storage directly to the welding machine. Even on welds 140 inches long, Page holds every time!

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—the source for answers to welding problems

OPERATOR end-welds studs through predrilled holes in painted plywood panels used for first time on gondolas.

Railroad car linings installed faster with welded studs

End-welded studs and special flush-driven nuts save as much as 40% in labor costs in installing painted plywood lining in drop-bottom gondolas.

A NEW COMBINATION of end-welded studs and special flush-driven nuts recently permitted faster installation of better linings for high-side railroad cars.

In addition, the materials and new production techniques saved as much as 40% in labor costs.

The studs and nuts were used by the Magor Car Corp., Clifton, N.J., to fasten plywood lining for the first time in drop-bottom gondolas that carry wood chips for the paper industry.

Installed in 400 cars, the plywood was the only siding required and was mounted directly on exterior steel framework. It took only 1½ hours for eight men to install the lining.

Nelson ½-in.-diameter studs were end-welded to side frames through predrilled holes in plywood panels, and T-nuts were run down on the threaded studs. The T-nuts were designed to bite into the wood until they were flush with the surface. Thus, no countersinking of holes was necessary.

Two men working on one car side each maintained a six-stud-per-minute welding average. T-nuts were run down with impact wrenches at the same rate.

A more difficult and expensive alternate to end-welded studs for fastening the plywood would have been to drill holes for bolts in the side frames. Such a method would have involved increased labor for placing bolts and for matching holes in the plywood and the steel.

The 1½-hr installation time for each side lining included:

1 — Bringing a steel frame to a work station.

2 — Blowing dirt and grit off the steel.

3 — Spray painting each frame.

4 — Clamping plywood panels in place.

5 — Center-punching through the plywood holes to bare stud locations through the paint.

6 — Stud welding.

7 — Running down nuts.

8 — Locking the T-nuts to the studs by center-punching the stud ends and thus expanding them.

ONLY the frame is steel on the sides of 400 new high-side drop-bottom gondola cars like this one on which painted plywood linings were installed with end-welded studs.

HAYNES STELLITE cobalt-base alloy, deposited mechanically, is used to hard-surface this 12 in. diameter, 24-ft. plastic-extrusion screw.

Hard-Facing?

There's a
HAYNES Alloy
for the Job!

What happens to hard-facing quality when you switch from manual to automatic? Here's a typical case:—

Sound, smooth, non-porous deposits were being achieved manually on the flights of big conveyor screws. As production volume increased, HELIARC automatic hard-facing promised economies.

After the switch, deposits were of the same high quality. Economies soared. The key: A HAYNES STELLITE cobalt-base alloy—equally reliable whether deposited manually or by machine. And note this: The automatic method cut deposition time up to 40 per cent. Saved 10 to 15 per cent in material.

Whatever hard-facing method you select as most economical, remember there's a HAYNES alloy that will work with it . . . and do an outstanding job of protecting the part. HAYNES alloys come as powders, bare rods, electrodes, tubes and coils. Write for full information.

HAYNES ALLOYS

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Address inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, N.Y.

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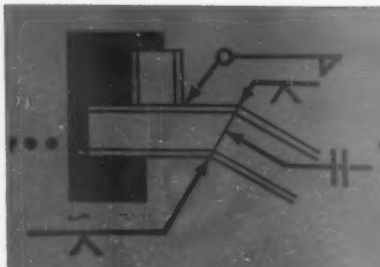


the welding clinic

Here you may find the solution to your welding problems, whether they concern design, production, construction or maintenance welding. Submit your questions for answering on this page.

Preparing surfaces for metallizing

Question:

In the last clinic, you gave the uses of metallizing. Could you tell me the best surface preparation method for metallizing?

Answer:

The most extensively used method of preparing metal surfaces for metallizing is blast cleaning with either steel grit or sand, according to THE WELDING ENCYCLOPEDIA, 14th Edition.

Blast cleaning results in a thoroughly roughened and clean surface ideal for metallizing.

Steel grit is best for blast cleaning and can be used over and over again. Steel grit is recommended for all work where blast material can be recovered and especially for machine element work which cannot be prepared by the shaft preparation method.

Sand is recommended for all work where the blast material cannot be recovered, such as bridges and other large structures. The sand should be a good grade of hard (preferably silica or flint) angular, washed sand from 16 to 20 mesh size.

Finer sand will result in clean surfaces, but improperly roughened ones. Coarse sands will give good results, but blast cleaning will be slow and expensive. Sand must be kept dry.

For all sand or grit blast work on metallic surfaces, except where there is danger of warping the base material, air pressure of 80 to 100 psi is recommended and even higher pressures should be used if available. The air supply for blasting must be dry and free from oil.

Surfaces can also be prepared by the fuse-bond method which consists of fusing a bonding material electrically into the surface to be metallized.

The sprayed metal in turn secures an extraordinarily strong bond to the bonding material. No heat is transmitted to a degree sufficient to disturb the base metal or cause distortion or loss of hardness.

Preparation is performed by striking the surface with electrodes held six at a time in a special holder. Special equipment for this method is small and portable and can be plugged into a 110 or 220-volt power source. During heaviest use, power consumed averages 3 kva.

No special skill is required for perfect results and the procedure can be applied to all machine element work that would otherwise call for blasting, grooving or rough threading.

Question:

Is there any quick way to tell the difference between aluminum and magnesium and can the two metals really be welded successfully with the same rods?

Answer:

Contrary to a common belief, aluminum welding rods are not suitable for welding magnesium nor are magnesium rods suitable for welding aluminum. Such improper welds are brittle and invariably crack in service.

According to Rudy Mohler, instructor at the Hobart Welding School, Troy, Ohio, weight alone can not be relied on to determine the difference between magnesium and aluminum.

The best identification method is to chisel a few pieces of metal from the piece in question. Then make a small pile of the pieces and, using a small tip, direct a slightly reducing oxyacetylene flame on them.

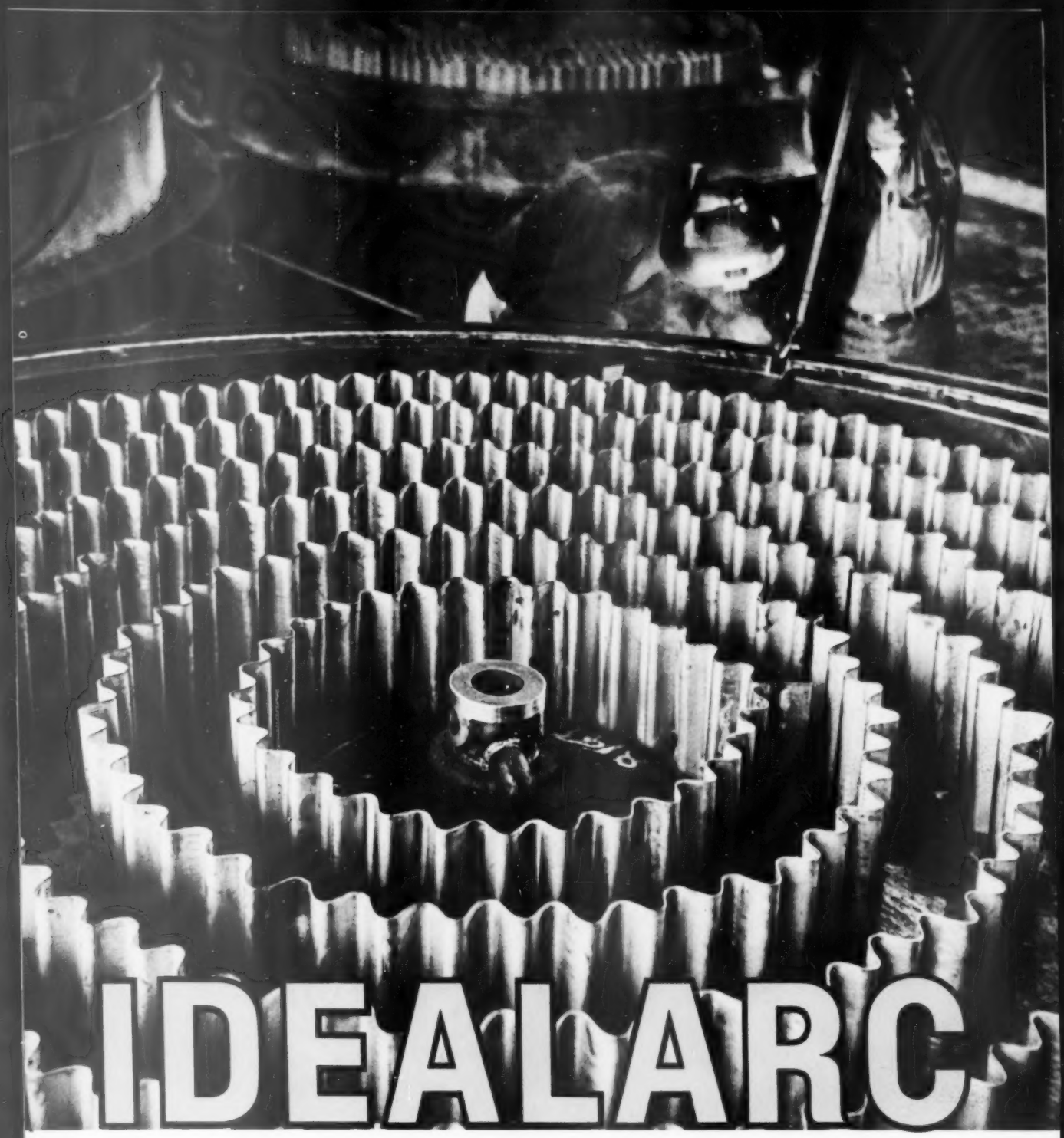
If a Tig torch is used, throttle the amp and gas to minimum setting. If the slivers burn in a flash and a silvery-white ash remains, the metal is magnesium. If they do not burn instantly, but oxidize into a black mass, the metal is aluminum.

Another method is to deposit an aluminum or magnesium weld on the metal to be identified. Then take a chisel and remove the weld. If it comes off in slivers, the base metal is the same as the rod used. If it crumbles off in chunks or small pieces, the base metal is not the same as the rod.

Be sure to clean the surface of the metal to be identified since contamination can make the weld brittle even when the proper welding rod is used.

Mohler advises that the surface be cleaned with a good solvent. Remove other contamination with a scraper, chisel, or file made for soft metals and finish with a stainless steel brush. Never use a grinding wheel.

For more facts Circle No. 183 on Welding Info-Aid Card →



Right at this moment, you may have a welding problem. The ideal solution is a welder which will most profitably perform the immediate task, and which will also permit you to change your operations to meet future market conditions or accommodate newly developed electrodes. On the next few pages, we propose to show that Lincoln Idealarc Welders are best suited to accomplish precisely these objectives.

These are Lincoln IDEALARCS on the job

Lincoln *Idealarc TM*, AC/DC machine is excellent for shipyard use. Most vertical and out-of-position welding takes DC electrodes, thus, the obvious need for DC current. Downhand welding, on the other hand, is usually done with iron-powder electrodes which take AC. Just a flip of the switch instantly changes current, lets the weldor select the correct current for each electrode, each job.

Here, straight AC *Idealarc TM's* predominate since this shop has been set up to operate on long production runs using AC electrodes. For this purpose, no other machine made will provide better service at lower initial or operating cost. Optional accessories let you tailor-make your TM for your particular operations.

In the Lincoln family of heavy-duty Idealarcs, there are three machines, the TM, the TIG and the R3M. R3M uses DC electrodes only; the TM, both AC and DC electrodes; and the TIG, any stick electrode or the inert gas process. One or more of these machines will handle every conceivable manual welding chore that could arise. And do it profitably!

Idealarc TM's are available in two different models, a straight AC and an AC/DC. When you select the AC/DC version, you can change from one current type to the other just by flipping a switch—it's that fast. Thus, you can take full advantage of those rods which work best on DC, or use the more recently developed electrodes which frequently require AC. Obviously, with the competitive demands for increased speeds and top electrode performance, the ability to select either AC or DC at a moment's notice gets more important each year. Because this is done so easily with the *Idealarc TM*, it is the favorite of many production men today.

Some work is, on the other hand, highly repetitive year-in, year-out. It may require either AC or DC. Here, low-cost, long-lasting equipment may be more important than machine flexibility. If yours is this kind of an operation, the *Idealarc TM* AC-model cannot be beaten for lowest cost, and the *Idealarc R3M* is the finest available three-phase DC-rectifier. It draws balanced current from the power line as do motor generator sets, but R3M's have the advantage of being essentially quiet. Further, when spatter control is important, such as on many stainless steel jobs, the R3M will give somewhat less spatter.

With the increased use of stainless steel, aluminum, magnesium and other special metals in modern fabrication, inert gas welding is becoming more important every day. To provide you with a welder which will perform TIG welding tasks and still be useful on normal stick welding jobs that make up the bulk of most shop work, Lincoln has developed the *Idealarc TIG*. With it, you can get both AC and DC welding current plus high-frequency, gas and water controls. In the TIG welder, then, you have the most complete, most versatile machine made.

LINCOLN WELDERS

Each Idealarc machine—as the name implies—is ideal for solving a variety of welding problems. To each you can add optional accessories such as remote current or polarity controls, even power packs to permit the largest sizes to be used as power sources for submerged arc welding. Thus you can select the model and optional accessories to suit immediate and foreseeable needs. You pay for no more. Why not let your Lincoln field engineer, a specialist in welding, explain the capabilities of each of these machines soon.

Shops like this one which consistently weld with and have need for a great many DC machines, may well wish to take advantage of the quiet operation of the *Idealarc R3M*, DC welder. Their highly efficient silicon rectifiers won't age or deteriorate. Special circuitry provides exceptionally good protection against overloads.

Here the *Idealarc TIG* is used as power source for inert gas process. Machine lets you weld with AC- or DC-electrodes, too. Factory-equipped with high-frequency, gas and water controls plus many other optional features. However, you select only those you need, and save the expense of buying unnecessary capabilities.

LINCOLN WELDERS

IDEALARC TIG's
AC or DC Inert Gas Plus AC or AC/DC

Idealarc TIG's are available in 300-amp models, both AC and AC/DC, with or without high-frequency, gas and water controls. All are NEMA rated machines. Ask Lincoln sales engineer for Bulletin 4608.1.

IDEALARC TM's
AC and AC/DC Welders

Idealarc TM's are furnished in 300, 400, 500 and 650-amp models in both straight AC and AC/DC models. Each is a NEMA rated machine. Want more information? Ask for Bulletin 4607.1 which describes 300-amp and larger sizes. 250-amp Idealarc described in Bulletin 4606.1.

IDEALARC R3M's
Three-Phase, Rectifier Welders

Idealarc R3M's are built in 300, 400, 500 and 650-amp sizes. Each is NEMA rated. Need details? Ask your Lincoln specialist for Bulletin 4609.1. Or write to:

THE LINCOLN ELECTRIC COMPANY

Department WW-9 Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT AND ELECTRODES

Stainless steel specifications

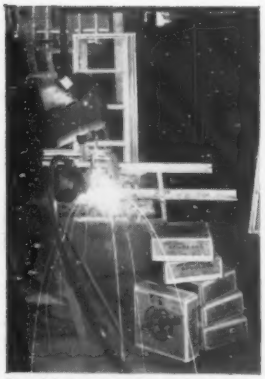
AISI Type Number or Armco Special Grade	Carbon (Max.)	Mang. (Max.)	Phos. (Max.)	Sulfur (Max.)	Silicon (Max.)	Chromium	Nickel	Other Elements	Similar SAE Number	Similar AMS Number
201	0.15	5.50/ 7.50	0.060	0.030	1.00	16.00/18.00	3.50/ 5.50	N 0.25 Max.	———	———
202	0.15	7.50/10.00	0.060	0.030	1.00	17.00/19.00	4.00/ 6.00	N 0.25 Max.	———	———
301	0.15	2.00	0.045	0.030	1.00	16.00/18.00	6.00/ 8.00	———	30301	———
302	0.15	2.00	0.045	0.030	1.00	17.00/19.00	8.00/10.00	———	30302	5515C, 5516E, 5517D, 5518C 5519E, 5636A, 5637A, 5688C
302B	0.15	2.00	0.045	0.030	2.00/3.00	17.00/19.00	8.00/10.00	———	———	———
303	0.15	2.00	0.020	0.15 Min.	1.00	17.00/19.00	8.00/10.00	[a]Mo 0.60 Max.	30303F	5640E, 5641A, 5738
303Se	0.15	2.00	0.020	0.060	1.00	17.00/19.00	8.00/10.00	Se 0.15 Min.	30303F	5640E, 5641A, 5738
304	0.08	2.00	0.045	0.030	1.00	18.00/20.00	8.00/12.00	———	30304	5513, 5560D, 5565D, 5566C 5639A, 5697
304L	0.03	2.00	0.045	0.030	1.00	18.00/20.00	8.00/12.00	———	———	5511A, 5647
305	0.12	2.00	0.045	0.030	1.00	17.00/19.00	10.00/13.00	———	30305	5514A ———
307	0.15	3.75/4.75	0.045	0.030	1.00	19.00/22.00	9.00/10.50	———	———	———
308	0.08	2.00	0.045	0.030	1.00	19.00/21.00	10.00/12.00	———	30308	———
309	0.20	2.00	0.045	0.030	1.00	22.00/24.00	12.00/15.00	———	30309	———
309S	0.08	2.00	0.045	0.030	1.50	22.00/24.00	12.00/15.00	———	———	5523, 5574, 5650
310S	0.08	2.00	0.045	0.030	1.50	24.00/26.00	19.00/22.00	———	30310	5521B, 5572B, 5577A, 5651C
314	0.25	2.00	0.045	0.030	1.50/3.00	23.00/26.00	19.00/22.00	———	———	———
316	0.08	2.00	0.045	0.030	1.00	16.00/18.00	10.00/14.00	Mo 2.00/3.00	30316	5522B, 5573B, 5648B, 5690E
316L	0.03	2.00	0.045	0.030	1.00	16.00/18.00	10.00/14.00	Mo 2.00/3.00	———	———
316F	0.10	2.00	———	———	1.00	16.00/18.00	10.00/14.00	P or S 0.07 Min.	———	5649 ———
								Mo 1.75/2.50		
317	0.08	2.00	0.045	0.030	1.00	18.00/20.00	11.00/15.00	Mo 3.00/4.00	30317	———
319	0.07	2.00	0.045	0.030	1.00	17.50/19.50	11.00/15.00	Mo 2.25/3.00	———	———
321	0.08	2.00	0.045	0.030	1.00	17.00/19.00	9.00/12.00	Ti 5 x C Min.	30321	5510F, 5557A, 5559, 5570G 5576B, 5645F, 5689
325	0.25	2.00	0.045	0.030	1.00	7.00/10.00	19.00/23.00	———	30325	———
329	0.20	2.00	0.045	0.030	1.00	25.00/30.00	3.00/ 5.00	Mo 1.00/1.50	30329	———
347	0.08	2.00	0.045	0.030	1.00	17.00/19.00	9.00/13.00	Cb +Ta 10 x C Min.	30347	5512B, 5556A, 5558, 5571B
347F Se	0.08	2.00	0.045	0.030	1.00	17.00/19.00	9.00/12.00	Cb +Ta 10 x C Min. +Se	———	5573F, 5646D
348	0.08	2.00	0.045	0.030	1.00	17.00/19.00	9.00/13.00	Cb+Ta 10 x C Min.	———	———
								Ta 0.10 Max., Co 0.20 Max.	———	———
16-18	0.08	1.00	0.040	0.030	1.00	15.00/17.00	17.00/20.00	———	———	———
17-4 PH	0.07	1.00	0.040	0.030	1.00	15.50/17.50	3.00/ 5.00	Cu 3.00/5.00	———	5643D
								Cb+Ta 0.15/0.45		
17-7 PH	0.09	1.00	0.040	0.030	1.00	16.00/18.00	6.50/ 7.75	Al 0.75/1.50	———	5528A, 5529A, 5568, 5644A
										5673A ———
PH15-7 Mo	0.09	1.00	0.040	0.030	1.00	14.00/16.00	6.50/ 7.75	Mo 2.00/3.00, Al 0.75/1.50	———	———
17-10 P	0.15	1.00	0.20/0.30	0.030	1.00	16.00/18.00	9.00/11.00	———	———	———
12-2 W	0.20	1.00	0.040	0.030	1.00	12.00/14.00	1.75/ 2.25	W 2.50/3.50	———	———
22-4-9	0.45/0.60	7.00/10.00	0.045	0.120	1.00	20.00/23.00	3.00/ 5.00	N 0.30/0.50	———	———
403	0.15	1.00	0.040	0.030	0.50	11.50/13.00	———	———	———	———
405	0.08	1.00	0.040	0.030	1.00	11.50/14.50	———	Al 0.10/0.30	———	———
410	0.15	1.00	0.040	0.030	1.00	11.50/13.50	———	———	51410	5504D, 5591C, 5613C
414	0.15	1.00	0.040	0.030	1.00	11.50/13.50	1.25/ 2.50	———	51414	5615B ———
416	0.15	1.25	0.060	0.15 Min.	1.00	12.00/14.00	———	[a]Mo 0.60 Max.	51416F	5610E
416Se	0.15	1.25	0.060	0.060	1.00	12.00/14.00	———	Se 0.15 Min.	51416F	5610E
420	Over 0.15	1.00	0.040	0.030	1.00	12.00/14.00	———	———	51420	5506A, 5621
420F	Over 0.15	1.00	———	———	1.00	12.00/14.00	———	P or S 0.07 Min.	51420F	5620B ———
								Zr or Mo 0.60 Max.		
420F Se	Over 0.15	1.00	———	0.030	1.00	12.00/14.00	———	P or S 0.07 Min.	51420F	5620B ———
								Zr or Mo 0.60 Max.		
430	0.12	1.00	0.040	0.030	1.00	14.00/18.00	———	———	51430	5627 ———
430Ti	0.12	1.00	0.040	0.030	1.00	14.00/18.00	———	Ti 6 x C Min.	———	———
430F Se	0.12	1.25	0.060	0.15 Min.	1.00	14.00/18.00	———	[a]Mo 0.60 Max.	51430F	———
431	0.20	1.00	0.040	0.030	1.00	15.00/17.00	1.25/ 2.50	Se 0.15 Min.	51431	5628B ———
440A	0.60/0.75	1.00	0.040	0.030	1.00	16.00/18.00	———	Mo 0.75 Max.	51440A	5631 ———
440B	0.75/0.95	1.00	0.040	0.030	1.00	16.00/18.00	———	Mo 0.75 Max.	51440B	———
440C	0.95/1.20	1.00	0.040	0.030	1.00	16.00/18.00	———	Mo 0.75 Max.	51440C	5630C ———
440F	0.95/1.20	1.00	———	———	1.00	16.00/18.00	———	P or S 0.05 Min.	51440F	5632B ———
								Zr or Mo 0.60 Max.		
440F Se	0.95/1.20	1.00	———	0.030	1.00	16.00/18.00	———	P or Se 0.07 Min.	———	———
442	0.25	1.00	0.040	0.030	1.00	18.00/23.00	———	———	51442	———
446	0.20	1.50	0.040	0.030	1.00	23.00/27.00	———	N 0.25 Max.	51446	———
501	Over 0.10	1.00	0.040	0.030	1.00	4.00/ 6.00	———	Mo 0.40/0.65	51501	5602A ———
502	0.10	1.00	0.040	0.030	1.00	4.00/ 6.00	———	Mo 0.40/0.65	———	———

Courtesy Peter A. Frasse & Co., Inc.

For more facts Circle No. 184 on Welding Info-Aid Card

SPOOLED WIRE

USE SPOOLARC®



Rapid fabrication of aluminum window frames by metal inert-gas welding requires trouble free aluminum wire. Philadelphia manufacturer increased his production with mirror-finish All-State SPOOLARC®

for porosity-free welds... constant arc... better control ...fewer errors... faster work

Aluminum wire in all tempers now available in mirror finish, oil-free, precision layer wound spools. ALL-STATE's cleaning and tension controlled winding method produces wire free from helix (twist), permitting welds that do not walk.

Aluminum SPOOLARC® is packaged with desiccant in sealed plastic bags to eliminate moisture, a common cause of porosity in welds.

OTHER METALS—silicon bronze, deoxidized copper, aluminum bronze, phosphor bronze, magnesium, and nickel. Available in SPOOLARC® form. For more information on SPOOLARC® and other ALL-STATE products, send for free 56-page Instruction Manual and SPOOLARC® literature.

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Pipeline News

The Federal Power Commission has authorized Transcontinental Gas Pipe Line Corp., Houston, Tex., to construct and operate a pipeline loop to bypass a hydroelectric project being built in North Carolina.

Transco will build about 15 miles of 36-in. main pipeline loop, add weights to existing loop segments that will be flooded and relocate a water pumping station. Construction will cost approximately $2,860,000.

Atlantic Seaboard Corp., Charleston, W. Va., has been authorized by FPC to build about 13.4 miles of 26-in. and about 6.4 miles of 20-in. loop pipeline in Virginia and Maryland.

FPC has granted temporary authority to Natural Gas Pipeline Co. of America, Chicago, for construction of pipeline facilities, estimated to cost $1,128,000, to enable it to receive natural gas produced in the Normanna Field in Bee County, Tex.

Southern Natural Gas Co., Birmingham, Ala., has been authorized by FPC to build natural gas pipeline facilities from time to time until August 6, 1961. The total cost of the facilities will not exceed $3 million with the cost of any single project limited to $500,000.

FPC has granted Transwestern Pipeline Co., Houston, temporary authority to construct and operate natural gas facilities costing about $2,452,200.

United Gas Pipe Line Co., Shreveport, La., has temporary authority to construct and operate about 217 miles of 30-in. pipeline in Louisiana. Estimated cost of the project is $31,828,000.

Mountain Fuel Supply Co., Salt Lake City, will build about 20 miles of 20-in. loop line at an approximate cost of $3,125,000, and Hope Natural Gas Co., Clarksburg, W. Va., will replace about 20 miles of 12-in. pipeline with 20-in. pipe in West Virginia at a cost of about $2,097,100.

The Federal Power Commission has granted temporary authority to Trunkline Gas Co., Houston, Tex., to build about 77 miles of pipeline in Louisiana at approximately $18 million.

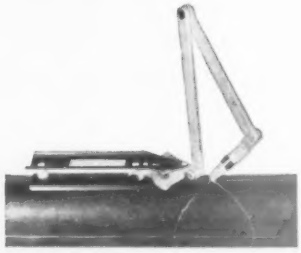
World's newest engineering center welded with M&T Murex electrodes

On October 1, 1959, ground was broken for the new all-welded United Engineering Center on New York's United Nation's Plaza. Scheduled for completion in late 1961, the building is 18 stories high, contains 179,855 sq. ft. of space. Construction consumed 15 tons of electrodes. In erecting the steel for this Engineering Center, the engineers of Dreier Structural Steel Company put their trust in Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, N. J.

M&T MUREX
PRODUCTS FOR BETTER WELDING

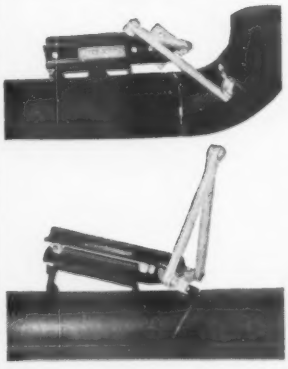
CURV-O-MARK

Contour Marker



Marks off any pipe joint or structural angle cut accurately, easily and without figuring cutbacks. Contour Markers mark all around pipe — save both time and gas. Available in 2 sizes of 1½" to 18" in cross-section, 16" to 48" diameter.

Combination Adaptor

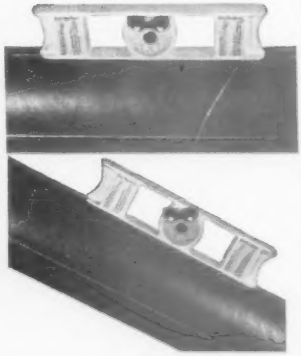


FOR CONTOUR MARKER

Adaptor allows layman to use all sides of Contour Marker in layouts on pipe and structural steel. Standard model marks up to 30" pipe, without having to quarter or halve. Marks over surface irregularities and old welds, and without having to break wrap so far back on wrapped pipe. Compound angles can be marked in one setting of tool; also, any portion of tube turns or 90°. The combination adaptor also furnished for the Jumbo Marker on special order.

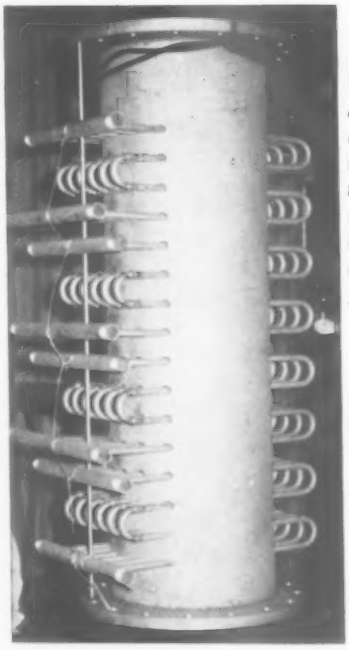
Pro-Mag-Level

Pocket size and equipped with two magnets on each plane for holding level in position. One side is machined flat for flat work, and the other, to a slight V-plane for pipe. Besides level, Pro-Mag-Level is equipped with 90° dial marked in 2½° increments and scales for rise in degree per foot or meter. Frame made of strong cast aluminum.



CONTOUR SALES CORPORATION

1843 E. Compton Boulevard Compton, California



VIEW of chemical process reactor prior to brazing shows tubes which were joined to the vessel with 192 simultaneously brazed joints.

192 joints brazed simultaneously to chemical reactor

A TOTAL OF 192 TUBE-TO-CHAMBER JOINTS were furnace brazed simultaneously to a chemical process reactor produced for a large manufacturer.

The complex vessel, manufactured by Stainless Processing Div. of Wall Colmonoy Corp., Detroit, has a 18-in.-diameter, 6-ft-long carbon steel main reaction chamber. Tubing is ¾-in.-diameter carbon steel.

Tube-to-header welds were made by the chemical manufacturer prior to brazing. Tubing elbows were also welded to straight sections.

The tubes were brazed to the reaction chamber in a pure, dry hydrogen furnace under controlled conditions at 1,950 to 1,980 F brazing temperatures.

Although accuracy as critical as ±0.002 in. can be achieved with furnace brazing, dimensional control was not a criterion in this application.

However, joint soundness and absolutely leakproof construction were specified requirements. This was achieved in the brazed assembly and was proved during inspection with a vacuum leak check following brazing.

World's biggest power shovel welded with M&T Murex electrodes

Picture this 6,588,000 lb. giant on the 50-yard line of a football field. It could dig a 65 cu. yd. dipper-full in one end zone, lift it 140 feet high, swing its 170-ft. boom and pile the 100 ton load on a 12-story building in the opposite end zone. For many of the shovel's most important weldments, the builder, Marion Power Shovel Co., put its trust in M&T Murex electrodes – products of METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey.

M&T MUREX
PRODUCTS FOR BETTER WELDING

This
FREE
GLOVE
GUIDE
helps you!

A true handbook to help you select the glove that gives the greatest protection for the longest time. A quick reference to glove styles, details, materials, chemical resistance, etc. Complete with sketches and case histories to increase your knowledge and save your money.

Riegel

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Sales offices and distributors in principal cities

WELDERS
GLOVES
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Horsehide glove shown

. . . Cool comfort!

Need a rugged glove with lots of finger action? Need extra heat protection? Need a light glove? Doesn't matter . . . there's a Riegel Welders glove or mitten just for you. Finer gloves at competitive cost: special tanning, seamless back, wool lining, and welted seams. To help select the *right* glove for your job, write for

FREE GLOVE GUIDE
A wealth of information: styles, types, materials, chemical resistance, case histories, and more.

WRITE: GLOVE DIVISION
RIEGEL TEXTILE CORP.
Conover, N. C.

Reprints still available from WE

Reprints of certain articles published in Welding Engineer are still available. A list of these appears below. Reprints may be obtained for 15 cents each, except where otherwise noted. Payment must accompany all orders. For quantity orders, write for special prices. Order by title from: Reprint Editor, Welding Engineer Publications, Inc. Box 28, Morton Grove, Ill.

Design for welding
Basic knowledge required when designing or redesigning for welded construction is detailed and discussed. Sixteen page reprint includes 11 data sheets.

The meaning of weldability
Weldability of carbon steels and alloy steels, as well as some other metals, is discussed. Sixteen page reprint includes three data sheets.

How to weld T-1 steel
Explains how to weld this high-strength low-alloy metal. Includes a data sheet on T-1 mechanical properties.

Fundamentals of oxyacetylene welding
Gives the basic essentials on and primary steps of oxyacetylene welding.

Welding of dissimilar metals
Complete details on welding dissimilar metals using NiCrFe electrodes and wires. Eight page reprint includes charts on properties test results and data sheet on properties of other metals.

A guide to preheat
This 4-page reprint on benefits of preheat includes an engineering data sheet entitled "Recommended preheat for steel alloys."

Acetylene
A 12 page salute to the IAA and acetylene, details the great success of this gas. Includes a history of the IAA and "The Acetylene Journal."

Filler metals for brazing
Brazing filler metals are detailed and each group is analyzed. Includes data sheet on how to select silver brazing alloys.

Explosive welding and forming open another door
A report on one of the newest entries into the welding industry, and how one pioneer company turned theories and practices into realities.

Our modern-day mythology
A rebuttal to some old-wives tales about the hazards of welding fumes, plus safety recommendations for situations where hazards might develop.

Welding the reactive metals
This 12-page reprint describes techniques for Tig welding titanium, zirconium and tantalum. It also gives experimental data on resistance spot welding of tantalum.

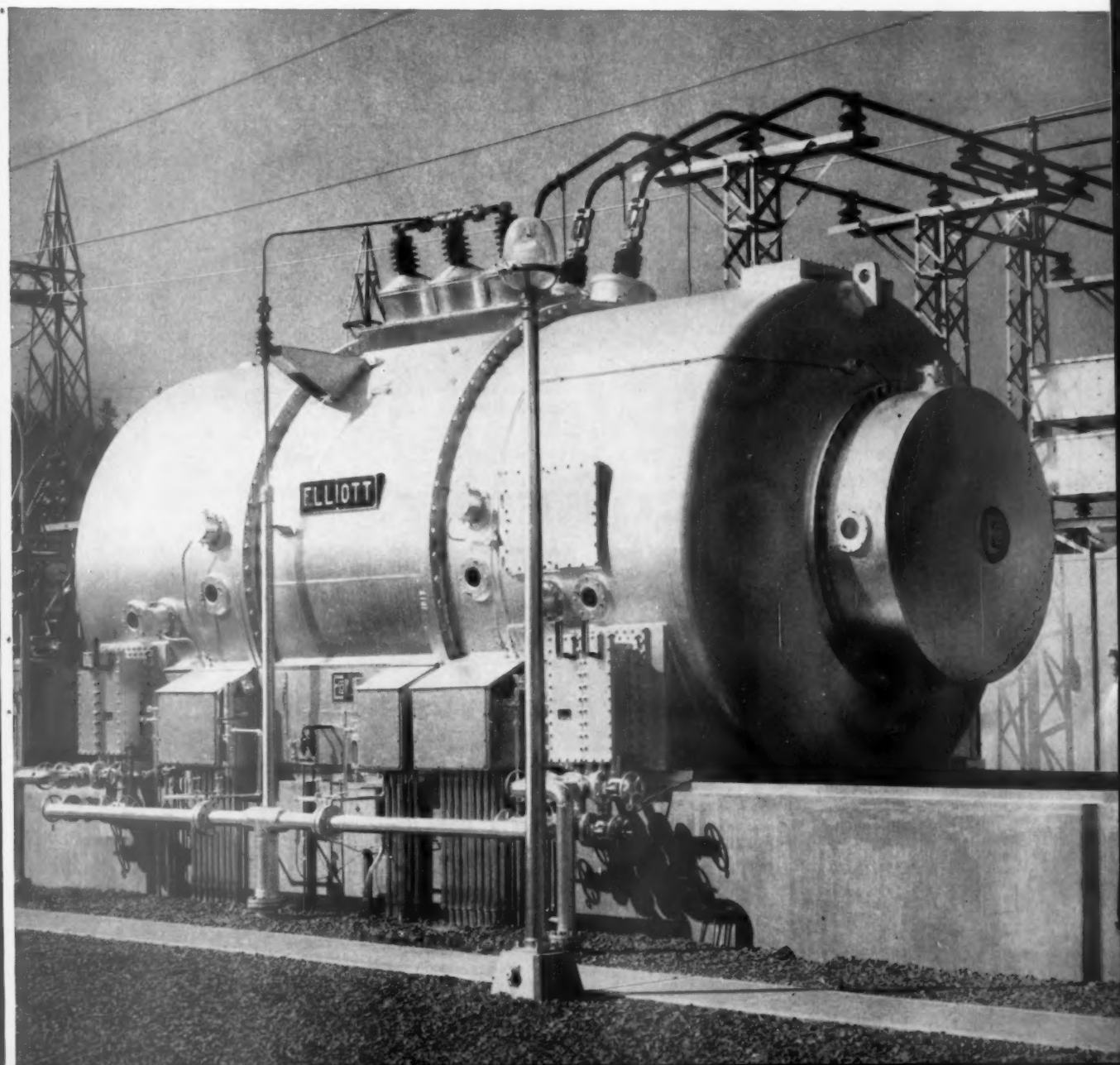
Welding 17-4 PH stainless steel
Sound joints can be easily produced in 17-4 PH stainless by proper welding practice. This 4-page reprint details all phases of the procedure.

Non-destructive testing
Four separate articles comprise this 8-page reprint on non-destructive testing: how to interpret radiographs; circumstances and job requirements govern selection of radiation source in inspection; ultrasonic testing; and a program for radiation safety.

World's toughest electrical machines welded with M&T Murex electrodes

Electrical engineers agree that the job of correcting power factor and regulating voltage requires the synchronous condenser to undergo some of the most severe mechanical and electrical stresses experienced in electrical machines. Rugged construction is a "must." Below is a 50,000-kva "electrical shock absorber" built by the Elliott Company. In welding its line of synchronous condensers, Elliott uses Murex electrodes—products of METAL & THERMIT CORPORATION, General Offices: Rahway, N. J.

M&T MUREX
PRODUCTS FOR BETTER WELDING



S-42 Chippers Goggle with flat, or 6:00D Bal-SAFE lenses, clear or in Ray-Ban shades 1, 2 or 3.

W'-35 Chippers Eyeshield with two Enduron 2"x4¼" plates; gives increased protection and provides air space which further reduces fogging.

S-41 Welders Goggle with Arc-Ban lenses in shades No. 3 through No. 6, with tough Enduron plastic cover lenses.

W'-36 Welders Eyeshields with 2"x4¼" Arc-Ban welding plate, shades No. 3 through No. 6, with Enduron cover plate.

RARE NEW COMFORT, ADDED PROTECTION, IMPROVED VISION

Bausch & Lomb Chippers and Welders
FLEXIBLE GOGGLES AND EYESHIELDS

Insure workers a greater degree of safety than ever before; give them more comfort, better vision. Insure more worker cooperation, too, because these goggles and eyeshields are so good looking in their new opaque flesh color and bright nickel louvers, vents and head bars! Soft and flexible, they fit snugly, comfortably. Eyeshield plates are replaced in seconds through side opening. Goggle head bars are adjustable as are two-tone elastic headbands.
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VIPs in review . . .

Aweco Supply Co., Tucson, Ariz., has promoted **Robert S. Smith** to sales manager. Smith has been with the firm for 10 years as a salesman.

Greene

Rothschild

At Air Reduction Co., Inc., New York City, **William J. Greene** has been appointed associate director of physical research, heading a new division of the firm's central research laboratories. Airco has also appointed **Gilbert R. Rothschild** assistant director of metallurgical development, heading another new division of the research laboratories.

Robert Igoe has been appointed Canadian branch sales manager of Gregory Fasteners, Ltd., Toronto. He succeeds **Herbert W. Scott** who has been transfered to the parent company, Gregory Industries, Inc., Lorain, Ohio. Gregory Industries has also appointed **Norman Fletcher** as branch manager in the Chicago territory.

Guy E. Sabin has been named general sales manager for Omark Industries, Inc., Portland, Ore. Sabin will be in charge of the Gramweld Stud Welding System division.

K. C. Andrew has been named manager of Tractors, Inc., Celina, Ohio. Andrew replaces **Herbert A. Aikman** who has resigned.

At Skil Corp., Chicago, **Ernest W. Hedeen** has been appointed director of engineering and **Ray Antonczyk** has been appointed assistant director. Skil has also named **Eugene J. Kelley** manager of the west coast warehouse in San Leandro, Calif.

Frank R. Tichy has been appointed manager of work order sales at the Houston, Tex., plant of Joseph T. Ryerson & Son, Inc.

Texas Alloy Products Co., Inc., Houston, Tex., has appointed **J. P. Ekholm** sales representative of Weld Clad products, and **R. A. Pennell** shop superintendent of the Weld Clad Dept.

Dennis M. Beckett has been appointed plant superintendent of Fabriform Metal Brazing, Inc., Los Angeles. Beckett will be in charge of all production and maintenance for the firm's brazing operations.

Frank V. McBride, mechanical contractor of Paterson, N.J., has been elected president of the Mechanical Contractors Association of America, Inc., New York City.

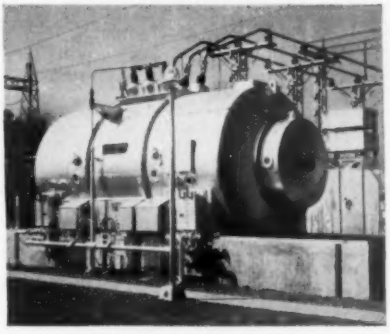
Thomas A. Watson has been appointed division superintendent of maintenance at South Works of United States Steel Corp. Watson succeeds **Charles E. Genovese** who has retired.

Samuel B. Barley has succeeded **B. Frank Albanese** as liquefied petroleum gas sales manager of the Esso Standard Div., Humble Oil & Refining Co., New York City. Albanese has retired.

Trent Tube Co., East Troy, Wis., has appointed **Fred W. Beitner** vice president in charge of sales. **L. R. Miller** has been appointed Trent's vice president in charge of manufacturing.

Newest

Biggest



Toughest

A new Engineering Center on the East Coast . . . a huge power shovel in the Mid-West . . . tough synchronous condensers on the West Coast . . . all across the United States, welding engineers are relying on M&T Murex electrodes.

You, too, will be able to find the proper Murex electrodes for your application . . . because there are over 1000 types and sizes in this meticulously manufactured line. It includes approved types in *Low Hydrogen, Iron Powder, Stainless Steel.*

Send for our helpful "Electrode Selector."

M&T MUREX welding products

METAL & THERMIT CORPORATION

General Offices: Rahway, New Jersey

Circle No. 189 on Welding Info-Aid Card

Now You Can Weld or Cut with a HELIARC "Tig-Twin" Kit...

When you own one of the new LINDE Heliarc "Tig-Twin" Kits, you're ready to take on almost any inert-gas-shielded arc welding or cutting job!

Use the lightweight torch for Heliarc welding. It's the fast, convenient method of joining ferrous and non-ferrous metals without flux. Then use the same torch to cut light-gage metals—without additional attachments.

Heliarc "Tig-Twin" Kits contain standard, high-quality LINDE components. They're designed to perform economically through years of trouble-free service. And the price is right. Talk to your nearby LINDE distributor now. Or write for his address to Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

LINDE COMPANY

UNION CARBIDE

LINDE, HELIARC and UNION CARBIDE are registered trade-marks of Union Carbide Corporation.

Ralph W. Shaw, Jr., president of A. R. Purdy Co., Inc., Lyndhurst, N.J., has been elected chairman of the executive committee of Steel Service Center Institute, Cleveland. **Robert J. Heggie,** president of A.M. Castle & Co., Chicago, was elected president of the Institute.

J. Roy Barefoot has been elected executive vice president of the McKay Machine Co., Youngstown, Ohio. Others elected by the firm's board of directors were **Ralph N. Leitzell,** vice president and treasurer, and **D. M. Davis,** vice president in charge of special projects.

Barefoot

Orden

David B. Orden has been named manager of Latin American operations for the International Division of Metal & Thermit Corp., New York City.

The Burdett Oxygen Co., Cleveland, has appointed **Robert B. May** to the office of treasurer and controller, and **Jack Oberst** has been promoted from resident manager in Sante Fe Springs, Calif., to vice president in charge of sales.

John E. Holt has been appointed assistant to the vice president of operations and production for Crucible Steel Co. of America, Pittsburgh. He was formerly division superintendent for flat rolled products at the firm's Midland, Pa., works.

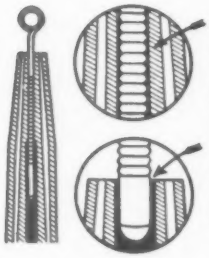
Glenn P. Bakken has been re-elected president of the Copper & Brass Research Association, New York City. Bakken is president of Chase Brass & Copper Co., Inc., Waterbury, Conn. Re-elected senior vice president was **E. P Dunlaevy,** executive vice president of Phelps Dodge Copper Products Corp., Inc., New York City.

Let Your Local Welding Supply Dealer Explain Why "YOU GET SO MUCH MORE" With . . .

WYPO
Wipes and Polishes
the World's Finest
CUTTING & WELDING TIP CLEANERS

FREE! NEW, SPECIALLY DESIGNED WYPO POLISHING FILE INCLUDED IN EACH SET

More Exclusive WYPO Features



These rounded outer edges of cleaning ridges clean and polish tip orifice without scratching or cutting.

This smooth pilot guides WYPO Tip Cleaner into tip. Will not enlarge or damage tip port.

This cross section view of WYPO Cleaning Surfaces shows these exclusive features: Rounded cleaning surfaces that won't jam or cut.

Straight sided valleys insure thorough cleaning by removing all waste.

SPRING LOADED SPOOL

Spring loaded brass spool. Will not rust. Holds cleaners securely in case.

DOUBLE WOUND EYES

Insures longer life for small sizes of WYPO Tip Cleaners. Will not pull out of case.

STAINLESS STEEL POLISHING FILE

Specially designed WYPO File furnished free in each set

NOW AVAILABLE IN 3 CONVENIENT SETS

WYPO TIP CLEANERS
STANDARD SET

CLEANER NO.	FOR DRILL
7	75-74
8	73-72-71
10	70-69-68
12	67-66-65
14	64-63-62
15	61-60
16	59-58
17	57
18	56
22	55-54
24	53-52
26	51-50-49

5 S WYPO FILE MADE IN U S A PAT NOS 2429581, 2473758 IN CANADA 1948

STANDARD SET OF (12) Cleans (27) Drill Sizes Nos. 73 to 49 Incl.

WYPO TIP CLEANERS
JUMBO SET

CLEANER NO.	FOR DRILL
28	48-47
30	46-45
32	44-43
34	42-41
37	40-39-38
20	37-36
42	35-34-33
44	32-31
45	30

5 S WYPO FILE MADE IN U S A PAT NOS 2429581, 2473758 IN CANADA 1948

JUMBO SET OF (9) Cleans (19) Drill Sizes Nos. 48 to 30 Incl.

MASTER SET

CLEANER NO.	FOR DRILL
7	75-74
8	73-72-71
10	70-69-68
12	67-66-65
14	64-63-62
15	61-60
16	59-58
17	57
18	56
22	55-54
24	53-52
26	51-50-49
28	48-47
30	46-45
32	44-43
34	42-41
37	40-39-38
20	37-36
42	35-34-33
44	32-31
45	30

5 S WYPO FILE MADE IN U S A PAT NOS 2429581, 2473758 IN CANADA 1948

WYPO TIP CLEANERS

MASTER SET OF (21) Cleans (46) Drill Sizes Nos. 75 to 30 Incl.

Replacement cleaners and files available. Cleaning Range— Cleaner No. & Drill Nos. stamped on back of each case. WYPO GIVES YOU MORE!

SOLD BY LEADING WELDING SUPPLY DEALERS

WYPO
MAITLEN AND BENSON, INC.
1395 Obispo St., Long Beach 4, Calif.

Circle No. 190 on Welding Info-Aid Card

Air Reduction Sales Co., New York City, has appointed **G. C. Wingate** assistant sales manager of the Charlotte, N.C., district and **V. B. Cassily** assistant sales manager of the Tampa, Fla., district. Airco has also appointed **W. J. Kocher, Jr.,** assistant manager in charge of engineering services for the Minneapolis district.

Wingate

Cassily

Kocher

Tyler

Magnaflux Corp., Chicago, has named **B. D. Tyler** to direct five-day training courses in nondestructive testing.

Jerry Flynn has been appointed assistant sales manager of H. K. Miller, Inc., Chicago.

The board of directors of Pullman Inc., New York City, has elected **Champ Carry** chairman of the board and **W. Irving Osborne, Jr.,** president. Osborne is a director of the Belden Mfg. Co., Chicago.

British Oxygen Canada, Ltd., Toronto, has appointed **Harold A. Agar** secretary-treasurer.

William C. Richards, Jr., of Bellows-Valvair Div., Akron, Ohio, has been elected president of the National Fluid Power Association. Vice presidents elected were **O. G. Lear** of Sarasota Precision Products, Sarasota, Fla.; and **Otto J. Maha,** Hannifin Co. Div., Des Plaines, Ill.

—your LINDE distributor!

In the business of welding, you'll find a capable partner in your LINDE distributor. He is ready and equipped to give you the fast, efficient, personal service you need. He maintains complete stocks of welding and cutting equipment and gases, welding rods, supplies, and accessories. And since it's his business to help your business, he concentrates on knowing what you want—and having it ready.

More than this, your LINDE distributor is an independent local businessman, familiar with nearby industry and its welding needs. When these needs include expert advice, he's prepared on that score, too. He can also call on LINDE's own technological services for the answers to new, different, or difficult welding problems. More than fifty years of pioneering in welding and cutting stand behind the LINDE brand name; through your LINDE distributor, this background is available to you.

A phone call is all it takes to get in touch with this valuable business partner. Look him up in the classified directory. Or, write for his address to Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada,* Union Carbide Canada Limited, Linde Gases Division, Toronto 12.

Your LINDE Distributor

"Where One Call Gets It All"

LINDE COMPANY UNION CARBIDE

"Linde" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

For more facts Circle No. 191 on Welding Info-Aid Card

BECKER *Keen-Cut* Electrodes

for use in CARBON ARC-AIR JET GOUGING

KEEN-CUTS—for the best characteristics of carbon and graphite in a carbon arc cutting electrode. Higher current capacity . . . longer life . . . shorter cutting time . . . greater material removal . . . smooth surface gouge . . . controllable accuracy . . . hot stable cutting arc . . . elimination of smoke and gases.

And they're low in cost. Try BECKER KEEN-CUT ELECTRODES—black or copper coated, standard diameters, 12″ lengths in 150 to 1400 amp. range—for the most efficient, labor-saving electrode in carbon arc/compressed air cutting.

A COMPLETE LINE OF CARBON AND GRAPHITE WELDING SUPPLIES—carbon and graphite electrodes, carbon rods and plates, welding paste, graphite cores and chills, graphite powder and particles of any mesh.

Write for Catalog

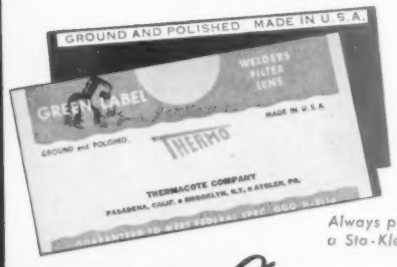
BECKER BROTHERS CARBON CO.

3436 South Laramie Ave. • Cicero 50, Illinois

Telephone: BI 2-1260 • Chicago

WELDERS--YOUR EYES DESERVE THE BEST!

ONLY THERMO GROUND and POLISHED FILTER PLATES CAN GIVE YOU 100% UNIMPAIRED VISION



There is no substitute for a Thermo Optically Ground and Polished Filter Plate which is carefully graded and selected to insure you a sharp definition and eliminate fatigue.

The restful soft green shade gives you maximum reduction of eye strain.

Always protect your Thermo Filter Plate with a Sta-Kleer All-Plastic long-life cover lens.

THERMACOTE Company

108 SOUTH DE LACEY AVENUE • PASADENA, CALIF.

John J. Farrell has joined the sales staff of Shieldalloy Corp., Newfield, N.J. He was formerly assistant manager of sales promotion and advertising of the Vanadium Corp. of America, New York City.

Harold K. Coyle has joined Eutectic Welding Alloys Corp., Flushing, New York, as manager of personnel.

John J. Chyle, director of welding research for A. O. Smith Corp., Milwaukee, has been awarded a distinguished service citation by the University of Wisconsin College of Engineering.

The National Society of Professional Engineers, Washington, D.C., has elected **Murray A. Wilson** as its president. Wilson is a consulting engineer in Salina, Kan.

M. G. Steele Co., Rome, N. Y., manufacturer of carbon-block brazing equipment, has appointed **John B. Clark** as sales representative for Illinois, Indiana, Michigan and Wisconsin.

Charles W. Krieg Co., Inc., Newark, N. J., has appointed **Robert Corey** sales manager of the welding division. Corey has been with the firm for 10 years.

DIED . . .

James J. Jordan, 61, retired manager of gas sales promotion for Linde Co., New York City, died recently. Jordan, who retired in 1960, had been with Linde since 1923.

Edward H. McGraw, eastern district sales manager for the chain and electrode divisions of The McKay Co., Pittsburgh, died recently after a brief illness. McGraw joined McKay in 1936 after serving as a field representative for General Motors Corp.

Distributor Appointments

Alloy Rods Co., York, Pa.: Rowell Welding Supply Co., Mobile, Ala.; Hopper Machine Works, Bakersfield, Calif.; and Tennessee Welding Supply Co., Knoxville, Tenn.

General Electric Co., Schenectady, N.Y., tungsten electrodes: Southern Oxygen Co., Bladensburg, Md.

Hobart Bros. Co., Troy, Ohio: Industrial Service Co., Providence, R.I.; Georgia Supply Co., Jacksonville, Fla.; Georgia Supply Co., Savannah, Ga.; Mansfield Oxygen Co., Mansfield, Ohio; Irish Welding Supply Co., Buffalo, N.Y.; Northern Welding Supply Co. of San Antonio, San Antonio, Tex.; Coss Welding Supply, Hagerstown, Md.; and Spina's Welding, Vineland, N.J.

International Rectifier Corp., El Segundo, Calif.: Bowen and Carlberg Co., Albuquerque, N.M.

National Cylinder Gas Div., Chemetron Corp., Chicago: Webb Pump and Supply, Inc., Escondido, Calif.

Steele, M. G., Co., Rome, N.Y.: Plastics & Equipment Sales Co., Morton Grove, Ill.

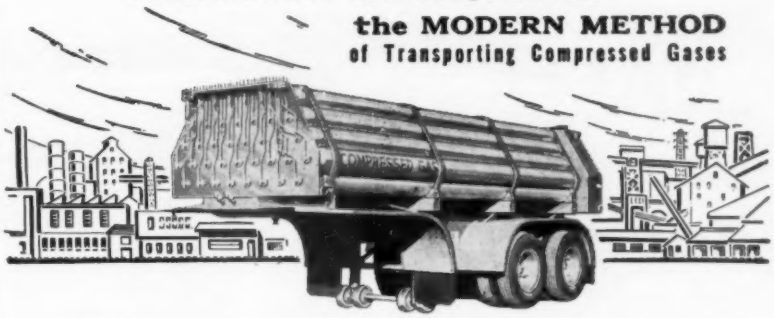
Unique Equipment Inc., Brooklyn, N.Y.: Acetogen Welding Supplies, Ltd., Vancouver, B.C., Canada; Broadway Welding Supplies, Pty., Ltd., Marrickville, Australia; and Soldicorte Engenharia, Sao Paulo, Brazil.

Willson Products Div., Reading, Pa.: Richardson Supply Co., Kansas City, Mo.

". . . about the weldor you people sent over."

For more facts Circle No. 193 on Welding Info-Aid Card

the MODERN METHOD of Transporting Compressed Gases



INDEPENDENT ENGINEERING CO.

gas supply TRAILERS tailored just for YOU

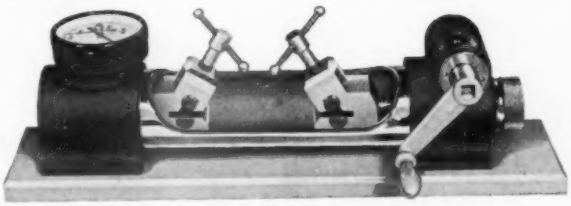
- MANIFOLD & CONTROLS — for YOUR Gas and Handling Requirements
- CAPACITY — to meet YOUR Requirements
- SAFETY — Cylinders, Safety Devices, Controls etc., All in accordance with ICC Requirements for YOUR Protection.
- CHASSIS — by leading Chassis Manufacturers with Service Branches throughout the United States for YOUR Convenience.

SEND YOUR INQUIRIES TODAY TO

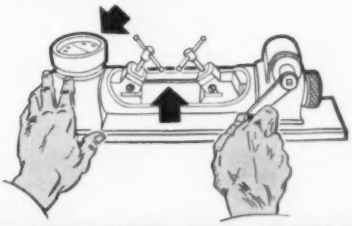
INDEPENDENT ENGINEERING COMPANY, Inc.
Manufacturers of
CONSULTING IECO DESIGNING RESEARCH
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · NITROGEN · ARGON
O'FALLON 5, ILLINOIS

Always Handy, A PORTABLE Tensile Tester

Use this compact, precision tensile tester to test strip steel, wire, bolts, spot welds, or anything else within its 4,000 lb. capacity. Use it in the shop, the lab, or in the field.



The maximum load requires only a moderate pull on the crank. Test results are easily read from the load gauge. Simple to use anywhere, any time. Write for catalog sheet and price.



Information on other Detroit standard and special tensile testing machines, with up to 40,000 lbs. capacity, will also be sent upon request.

DETROIT TESTING MACHINE COMPANY
9380 Grinnell Avenue, Detroit 13, Michigan

For more facts Circle No. 195 on Welding Info-Aid Card

CMD®

THE
chipping
hammer
WITH
SWING BALANCE

This is the hammer with the balanced feel—swings easy, fits the hand properly, absorbs shock. *Less fatigue* and it's a pleasure to use!

CMD heads are made of ¾" square tool steel. They can be re-sharpened right down to the shaft!

Type A 20 oz., drift and right angle chisel.
Type C 14 oz., drift and chisel.

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 W. 46th St. • Suite E-7 • Chicago 9, Ill.

TYPE A TYPE C

Use the best ! !

PACIFIC UW
FOR UNDERWATER WELDING

For mild steel underwater cutting Pacific UW has no equal. Using the same technique as applied on the surface, a skilled welder can produce 15 to 20 feet of fillet welds per hour. Welds will develop 80% off the original tensile strength.

PACIFIC UC
FOR UNDERWATER CUTTING

Steel, cast iron, bronze, monel and other non-ferrous metals of ANY dimension can be easily and quicky cut by any average operator. Pacific UC demands less skill, saves in operating costs.

For information on the complete line of Pacific electrodes write to:

PACIFIC *Welding Alloys*
340 NORTH AVENUE 2[illegible] • LOS ANGELES 31, CALIF

Circle No. 196 on Welding Info-Aid Card

QUIK-HEAT

up to 2200° F.

CLEMENTS
Cadillac
MODELS K3 & M2
BLOWTORCHES

Here are rugged, high efficiency blowtorches that speed up all types of heat treating and production operations. These two Clements Cadillac Blowtorches provide heat up to 2200°F. in seconds and are fully portable.

With the Clements Cadillac model K3 or M2 you can bring the torch to the work instead of the work to the torch as in fixed installations. Furnished fully equipped with 20 ft. of Underwriters' Laboratories and Canadian Standards Association approved 3-wire cable with plug, 10 ft. of gas hose with fittings ready to attach to your gas line and with sturdy, high stability stand. Easily adjustable for height and direction of torch.

Operates on natural, manufactured, or LP-gas.

CLEMENTS MFG. CO.
6645 S. Narragansett Ave., Chicago 38, Ill.
SINCE 1910
INDUSTRIAL PRODUCTS DIVISION

Circle No. 197 on Welding Info-Aid Card

In retrospect

(Taken from **Welding Engineer** issues of July, 1916, 1931 and 1946)

—45 Years Ago—

In our army, we hear of wagoners, artificers, saddlers and mechanics of various kinds, but we have never heard that the engineering corps includes weldors. Abroad, the armies are making very good use of oxyacetylene and electric welding apparatus, and it is to be hoped that our officers who are observing the operations recognize the adaptability of these processes to armies in the field.

Indications are that 1916 will be the banner year for manufacturers of welding equipment. Up to July, orders far exceeded last year's business for the same period . . . in some instances more than doubling it.

—30 Years Ago—

Depending upon the point of view, some men in the welding industry would refer to the shielded arc as revolutionary, and others would refer to it as another fad. It is a specialized form of metallic arc welding which apparently has developed from the work done in welding special types of pressure vessels . . . The coatings range from heavy layers of asbestos down to an electrode that is barely dusted with a chemical preparation . . . Its [the shielded arc] greatest usefulness may turn out to be along the lines of extending the use of arc welding rather than revolutionizing it.

—15 Years Ago—

M. G. Sedam has been appointed vice president in charge of research and production for Alloy Rods Co., York, Pa. He has been director of research since 1943.

J. A. Gulick has been appointed sales representative for Titan Metal Mfg. Co., Bellefonte, Pa. His office will be in Tulsa, Okla.

THE WELDING SHOPPER

UNDISPLAYED RATE

(Not available for equipment advertising) $1.10 a line, minimum 6 lines. To figure advance payment, count 5 average words as a line.

INDIVIDUAL EMPLOYMENT WANTED advertising rate is ½ the above rate; minimum $5, payable in advance.

INFORMATION

BOX NUMBERS count 1 line additional in undisplayed ads.

DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAY RATE

The advertising rate is $12.00 per inch for all advertising appearing on other than a contract basis. Maximum size of display ad is 4 col. in. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ in. vertically on one column, 3 columns — 30 inches — to a page.

HELP WANTED

Salesman to sell electric and gas welding supplies for franchised distributor in suburban Phila. area. Home every night. Must have knowledge of welding machines to handle growing demand for semi and fully automatic welding equipment. This is no white glove job, but pay is good and potential is excellent. Salary, commission and expenses. Write Box No. 712, c/o Welding Engineer, 5826 Dempster St., Morton Grove, Ill.

Men with experience in welding, cutting, brazing and sales. To sell revolutionary new gas in Illinois, Indiana, Michigan and Ohio. This is an opportunity to get in on the ground floor of a completely new industry. Send complete resume to Box No. 713, c/o Welding Engineer, 5826 Dempster St., Morton Grove, Ill.

WELDING REPRESENTATIVES

National manufacturer has immediate openings for two representatives:

SALES REPRESENTATIVES . . .

. . . immediate opening for a welding electrode and machine salesman to cover New York State (outside of N. Y. C.) area. Welding sales experience desired, but a good welding background or industrial sales experience will be considered.

TECH SERVICE REPRESENTATIVE . . .

. . working out of Metal & Thermit's General Offices at Rahway, N. J., tech service representative will cover Atlantic Coast States. He must be familiar with automatic, semi-automatic and manual welding processes and equipment. He will also be responsible for conducting product knowledge and training sessions for company sales personnel and distributors. A good technical background including shop or plant experience is desirable.

Regarding both positions, please send resume and salary requirements to Mr. A. D. Smith — Personnel Division

METAL & THERMIT CORPORATION
Rahway Avenue Rahway, New Jersey

EQUIPMENT FOR SALE

WELDER SALE

A.C.-D.C. 3/60/220/440, and 25 cycle and D.C.-D.C. Lincoln, Westinghouse, G. E., on running gear, F.O.B. Pittsburgh & Phila. $125.00 to $150.00 each.

300 Amp. G. E. gas drives on 4 wheels, F.O.B. Phila. $350. each.

ALEXSON EQUIPMENT CORPORATION
1331 W. Cumberland St.
Phila. 32, Pa.

AIRCO CUTTING MACHINE PARTS

Huge inventory of mechanical parts (no electrical) for Airco No. 10 and No. 4 Radiographs, No. 10 Planograph and No. 40 Travographs. Send for part lists.

RALL SUPPLY CO., 51 E. 42nd St., N.Y.C. 17

POSITIONERS & WELDERS

1-4600#-12" P&H WP-3; 2-6000# RANSOME positioners. Bargain prices. 300 & 400 amp Lincoln 3 Ph Welders, late models; buy or rent. 14 Miller Gold Star SRH-333, 300 amp welders; buy or rent.

J. A. CUNNINGHAM EQUIPMENT INC.
2025 Trenton Avenue Philadelphia 25, Pa.

OXYGEN PLANT

40 meter, up to 1600 cu. ft. per hour Factory rebuilt column as new. Liquid pump new; guaranteed. $20,000 net f.o.b. Detroit. Total value with electrical equipment $45,000.

ACETOGEN GAS COMPANY
20137 Sherwood Ave. Detroit, Michigan

SCHOOL

WELDING TRAINING. Complete or brush up courses in oxy-acetylene welding & cutting, Manual Arc, TIG, Automatic, Pipe (up & downhill), sheet metal, etc. Precode test training. Request bulletin from — Hobart Welding School, Box U-712, Troy, Ohio.

EQUIPMENT FOR SALE

HELP WANTED

SALES MANAGER

AUTOMATIC WELDING EQUIPMENT

Outstanding opportunity in new and rapidly expanding area of our business. Excellent potential for personal growth and development in marketing established line of automatic welding equipment and also related products under development.

The successful candidate for this position will meet the following requirements:

1. Experience at some level of sales management such as Sales Manager or Assistant, Regional Manager, Product Manager.
2. Experience in selling machinery, preferably welding equipment.
3. Familiarity with hardsurfacing desirable.
4. Age 30 to 45.

Submit resume in full confidence to:

THE McKAY COMPANY
AUTOMATIC WELDING DIVISION
1005 Liberty Ave. Pittsburgh 22, Pa.

EQUIPMENT FOR SALE

EQUIPMENT FOR SALE

WELDING ELECTRODES

AWS Type 11018

New in cans

4 T-1 and HY-80 Steel

85,000 lbs. 3/16"	.28 Per Pound in 2,000 lbs. or over
140,000 lbs. 7/32"	
63,000 lbs. 1/4"	

Also in stock, like quantities of Low-Hydrogen, Mild and Stainless Steel coated and bare brazing rods. *Large discounts.*

WARRANTED MATERIALS CORPORATION
5430 Wakefield Street • Philadelphia 44, Pennsylvania

To get your free copies, circle the appropriate number on Welding Info-Aid card. ↦

LITERATURE for your library

PREHEATING, STRESS-RELIEVING — Hobart Bros. Co. Thirty-two page, 16-section booklet, EW-249, answers many questions about why, when and what to preheat and stress-relieve.
Circle No. 76 on Info-Aid Card.

HEAVY DUTY ARC WELDER — National Cylinder Gas Div. Six models of combination a-c/d-c heavy-duty industrial metallic arc welder are described in bulletin (NH-195).
Circle No. 77 on Info-Aid Card.

INDUSTRIAL RADIOGRAPHY — E. I. DuPont De Nemours & Co., Inc. A-9234 REV. is 24-page illustrated booklet on products for industrial radiography.
Circle No. 78 on Info-Aid Card.

FILLER METAL BINDER — Wall Colmonoy Corp. Illustrated data sheet (No. 2.2.2) describes binder for powdered brazing filler metal and gives various viscosity ranges.
Circle No. 79 on Info-Aid Card.

SILVER BRAZING ALLOYS — Air Reduction Sales Co. Twenty-four-page manual (Form ADC 847C) discusses brazing procedures, problems and solutions with illustrations and diagrams.
Circle No. 80 on Info-Aid Card.

RESISTANCE WELDING — Sciaky Bros., Inc. Sixteen-page illustrated booklet on resistance welding (Vol. 5, No. 9) contains three reports on practical methods of profitable assembly with resistance welding techniques.
Circle No. 81 on Info-Aid Card.

STUD WELDING — Omark Industries, Inc. Form No. F6-3R is illustrated folder containing information on stud welding including charts on selection and strengths.
Circle No. 82 on Info-Aid Card.

OXY-FUEL GAS CUTTING — Linde Co. F-1439 is 7-page illustrated article on recent developments in oxy-fuel gas cutting.
Circle No. 83 on Info-Aid Card.

WELDED STEEL DESIGN — The Lincoln Electric Co. Four-page illustrated booklet explains how to improve rigidity and save weight in thin flat structures by welded steel designing.
Circle No. 84 on Info-Aid Card.

CABLE HOSE PROTECTOR — Singer Glove Mfg. Co. Two-color sheet (C-102) gives prices, information on zippered sleeve cable hose protector for Mig, Tig welding.
Circle No. 85 on Info-Aid Card.

METALWORKING EQUIPMENT — Di-Acro Corp. Thirty-two-page illustrated catalog (No. 61) in color includes benders, shears, punch presses and dies.
Circle No. 86 on Info-Aid Card.

ULTRASONIC WELDING — Clevite Electronic Components. Sixteen-page illustrated booklet shows the principal uses of piezoelectricity including use as means of producing ultrasonics for inspection of welds.
Circle No. 87 on Info-Aid Card.

NONDESTRUCTIVE TESTING — Philips Electronic Instruments. Twelve page 2-color illustrated booklet (RC-1763) gives information on full line of nondestructive testing equipment and its uses.
Circle No. 88 on Info-Aid Card.

REPAIR MATERIAL — Williamson Adhesives, Inc. Illustrated 4-page folder explains how epoxy-polyamide repair material can be used in various repair jobs.
Circle No. 89 on Info-Aid Card.

WELDING AUTOMATION — Acro Welder Mfg. Co. Sixteen-page catalog (No. 261) illustrates 68 special welding units with descriptive captions.
Circle No. 90 on Info-Aid Card.

POWER TOOLS — Skil Corp. Sixty-eight-page illustrated 2-color 1961 catalog (F-14875) includes hammers, saws, sanders, drills, shears and grinders.
Circle No. 91 on Info-Aid Card.

PLIERS, HAMMERS — Champion DeArment Tool Co. Fully - illustrated 3-color 16-page catalog (No. 361) shows full line of pliers, hammers.
Circle No. 92 on Info-Aid Card.

COATED ABRASIVES — The Carborundum Co. Catalog of coated abrasives for the automotive trades (Form No. A-1561) is a twenty-page fully-illustrated listing of discs, sheets, rolls, belts, sleeves and accessories.
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GRINDING WHEEL LUBRICANT — The Alpha-Molykote Corp. Bulletin 128 describes lubricant stick which is particularly useful on grinding wheels and cutting tools.
Circle No. 94 on Info-Aid Card.

ANGLE GRINDER — Tecnica Corp. Illustrated 2-color form (R 9523-04) shows how to use angle grinder in various applications.
Circle No. 95 on Info-Aid Card.

BRONZE WELDING ELECTRODES — Ampco Metal, Inc. Series of reference data charts pertains to all of firm's bronze welding electrodes, bare filler rods and wire.
Circle No. 96 on Info-Aid Card.

CYLINDER CARTS — Smith-Byrd Co., Inc. Illustrated sheet gives features of 3-wheel cylinder carts.
Circle No. 97 on Info-Aid Card.

ELECTRONIC WELDING — Hughes Aircraft Co. Seventeen-page technical report on metallurgy of electronic welding covers lab studies on resistance welding, weldability of various materials, weldability of clad materials and dissimilar metals.
Circle No. 98 on Info-Aid Card.

SPIKE WELDING METHOD — National Electric Welding Machines Co. Six-page illustrated issue of Welding News. Vol. 12, No. 2, describes spike welding in miniature electronic parts.
Circle No. 99 on Info-Aid Card.

HARDFACING ALLOYS — Haynes Stellite Co. Eight-page booklet (F-30030-C) describes hardfacing alloys available in coils with typical applications and selection chart.
Circle No. 100 on Info-Aid Card.

WELDING TABLES — The Challenge Machinery Co. Twelve-page catalog (No. 840) contains prices and descriptive specifications on over 400 precision surface equipment units including welding tables and layout platens.
Circle No. 101 on Info-Aid Card.

WELDING ROD COVERINGS — Croda Inc. Nine-page brochure (E 01, E 21) explains use of protaweld alginates in welding rod coverings.
Circle No. 102 on Info-Aid Card.

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WELDING info-aids

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NEW PRODUCTS on pages 20-29

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Advertisers' Literature

Literature offered in advertisements which were received up to the 5th of last month. To get the literature you want circle numbers on fold-out card at right.

156. Air Products Inc.—New brochure available explaining the advantages of **KG Regulators.**

176. Air Reduction Sales Co.—Engineering data and samples of Airco's new electrode "Easyarc 328" is available.

184. All-State Welding Alloys Co., Inc.—For additional information on "Spoolarc" send for the 56 page Instruction Manual.

158. Ampco Metal, Inc.—Bulletin W-17 on "Ampco-Trode" electrodes for overlay applications.

199. Anaconda American Brass Co.—Publication B-13 available, gives information on welding with Anaconda copper and copper alloys and the newest procedures are detailed.

191. Becker Brothers Carbon Co.—Catalog available on carbon and graphite for welding electrodes, rods and other materials for welding.

154. Bernard Welding Equipment Co.—Bulletin SS7 describes the features of the "Shortstub" electrode holder.

153. Bridgeport Brass Co. — Welding rod booklet available, "Bronze Welding."

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174. **Chicago Hardware Foundry Co.**—For a sample of "Fuse-Well" rods, circle No. 174 on the Welding Info-Aid Card.

194. **Detroit Testing Machine Co.**—Catalog sheet and price on the portable "Tensile Tester" for testing strip steel, wire, bolts and spot welds.

175. **Galv-Weld Products** — Write for information and sample of galvanizing manufactured by Galv-Weld.

159. Glenn Pacific Corp. — Literature specifications and prices on the new Glenn AC/DC power supply for TIG welding.

151. **Hobart Brothers Co.**—Write for bulletin DM-177 further explaining the "Micro-wire" package.

152. **Hobart Brothers Co.** — Catalog available on tubular wire for CO_2 fabrication, and hardfacing as well as stainless and non-ferrous.

189. **Metal & Thermit Corp.**—Send for the M&T "Murex" Electrode Selector.

164. **Metco Inc.**—Additional information on hardfacing by flame spraying is available in a booklet, "ThermoSpray."

177. **Miller Electric Manufacturing Co.**—Pamphlet available, "Rectifiers for Welding" and descriptive literature on the Miller gold Star SR welder.

168. **Oxo Welding Equipment Co.**—Complete catalog showing all models of regulators manufactured by Oxo, is available.

181. **Page Steel & Wire Div.**—Folders DH-402 and DH-1218 gives helpful information on the Page line of welding wire.

187. **Riegel Textile Corp.**—A handbook available, "Work Glove Selector Guide" explains the different styles, types, materials and chemical resistance of weldors gloves manufactured by Riegel.

167. **Tuffaloy, Air Reduction Sales Co.**—For further information on bent tips send for the Tuffaloy catalog.

178. **Victor Equipment Co.** — For information on profitable dealerships, circle No. 178 on the Welding Info-Aid card.

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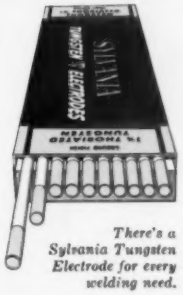

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